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TRANSACTIONS

OF THE

Mississippi Valley Medical Association.

TWENTY-FIFTH ANNUAL SESSION

HELD AT

CHICAGO, ILL., OCTOBER 3, 4, 5 AND 6, 1899.

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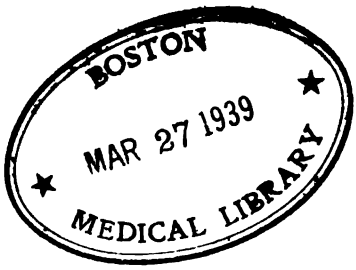

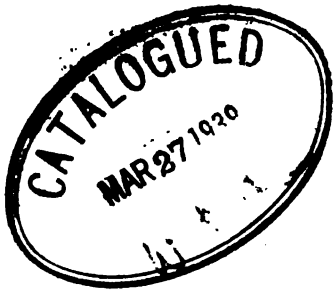

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Next place of meeting, Asheville, N. C., October 9, 10, 11, 1900.

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1877	*W. H. Byford, Chicago, Ill.			do	do	Evansville, Ind.	
1878	J. H. Hibberd, Richmond, Ind.			do	do	Springfield, Ill.	
1879	J. A. Ireland, Louisville, Ky.			do	do	Evansville, Ind.	*A. M. Owen.
1880	H. B. Buck, Springfield, Ill.	*Jos. W. Thompson, Paducah, Ky.	S. E. Mumford, Princeton, Ind.	do	do	Louisville, Ky.	W. W. Senteney.
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1882	J. M. Holloway, Louisville, Ky.			do	do	Terre Haute, Ind.	
1883	Wm. Porter, St. Louis, Mo.			do	do	Indianapolis, Ind.	*Theo. B. Harvey.
1884	*B. M. Griffith, Springfield, Ill.					Springfield, Ill.	
1885	*F. W. Beard, Vincennes, Ind.					Evansville, Ind.	
1886	Arch Dixon, Henderson, Ky.	*G. W. Burton, Mitchell, Ind.	T. D. Washburn, Hillsboro, Ill.	(Pro tem.) E. B. Montgomery, Quincy, Ill.	F. J. Leetz, St. Louis, Mo.	Quincy, Ill.	Jos. Robbins.
1887	I. N. Love, St. Louis, Mo.	Jos. Robbins, Quincy, Ill.	Jacob L. Geiger, St. Joseph, Mo.	J. L. Gray, LaPorte, Ind.	A. O. Dumesnil, St. Louis, Mo.	Crab Orchard Springs, Ky.	Dudley S. Reynolds.

*Deceased.

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1893	R. Stansbury Sutton, Pittsburg, Pa.	W. N. Wishard, Indianapolis, Ind.	W. S. Christopher, Chicago, Ill.	G. V. Fitzpatrick (R) *F. C. Woodburn, Indianapolis, Ind.	*A. M. Owen, Evansville, Ind.	Indianapolis, Ind.	Geo. J. Cook.
1894	Xenophen C. Scott, Cleveland, O.	Leon Straus, St. Louis, Mo.	G. Frank Lydston, Chicago, Ill.	do	Geo. J. Cook, Indianapolis, Ind.	Hot Springs, Ark.	T. E. Holland.
1895	W. N. Wishard, Indianapolis, Ind.	T. E. Holland, Hot Springs, Ark.	C. B. Parker, Cleveland, O.	do	H. N. Moyer, Chicago, Ill.	Detroit, Mich.	H. O. Walker.
1896	H. O. Walker, Detroit, Mich.	B. Merrell Ricketts, Cincinnati, O.	*F. C. Woodburn, Indianapolis, Ind.	Hanau W. Loeb, St. Louis, Mo.	do	St. Paul, Minn.	C. A. Wheaton.
1897	Thos. Hunt Stucky, Louisville, Ky.	C. A. Wheaton, St. Paul, Minn.	Paul Paquin, St. Louis, Mo.	do	C. A. Wheaton, St. Paul, Minn.	Louisville, Ky.	H. H. Grant.
1898	John Young Brown, St. Louis, Mo.	A. P. Buchman, Ft. Wayne, Ind.	A. J. Ochsner, Chicago, Ill.	Henry E. Tuley, Louisville, Ky.	Dudley S. Reynolds, Louisville, Ky.	Nashville, Tenn.	Duncan Eve.
1899	Duncan Eve, Nashville, Tenn.	A. J. Ochsner, Chicago, Ill.	J. C. Morfit, St. Louis, Mo.	do	do	Chicago, Ill.	H. N. Moyer.

*Deceased. (R) Resigned.

NOTE.

The Association assumes no responsibility for the views expressed in the papers read at its meetings.

HISTORICAL SKETCH.

BY W. N. WISHARD, A. M., M. D.,
INDIANAPOLIS, IND.

In 1875 the Tri-State Medical Society was organized at Vincennes, Ind., with Dr. B. F. Swafford, of Terre Haute, Ind., as President, and Dr. G. W. Burton, of Mitchell, Ind., as Secretary. The society was composed of physicians in the States of Indiana, Kentucky, and Illinois. From the date of its organization this society has had a successful career, and the vigor of its early and subsequent life is in no small degree due to the zeal and fidelity of the two officers above mentioned, and Dr. F. W. Beard, of Vincennes, who was the first Treasurer. Drs. Burton and Beard held the offices of Secretary and Treasurer from the date of the organization of the society until the Indianapolis meeting held in 1883, at which time the Tri-State Society had drawn to its membership physicians from many other States than the three originally included. At the Indianapolis meeting in 1883 the name of the society was changed to the Mississippi Valley Medical Association. The society had grown so rapidly that two years prior to the changing of its name the meeting was held in St. Louis, Mo., and indeed from that date it ceased to be a Tri-State Society. Although now it is nominally composed of physicians residing in States located in the Mississippi Valley, it is really national in its scope. Its field of greatest activity, however, is within the Mississippi Valley. Meetings have been held in the States of Indiana, Illinois, Kentucky, Missouri, Ohio, Arkansas, Michigan, Minnesota, and Tennessee.

The Mississippi Valley Medical Association is not a delegated body. When originally founded physicians in good

standing were admitted without reference to their affiliation with State and national organizations. It was, however, thought best to place the society in proper relation with the American Medical Association and the different State societies, and hence at the meeting at Quincy, Ill , in July, 1886, the following resolution was adopted: "*Resolved*, That the Mississippi Valley Medical Association adopts as a part of its organic law, and binding upon all its members, the code of ethics of the American Medical Association." The Association is still distinctively and peculiarly a voluntary organization, and yet the conditions of membership, at present, require eligibility to membership in local organizations that are auxiliary to the American Medical Association. Two of its ex-Presidents—Drs. J. H. Hibbard, of Richmond, Ind., and J. M. Mathews, of Louisville, Ky.—have also been Presidents of the American Medical Association.

In 1892, at the Cincinnati meeting, the society was first divided into sections. The First Vice-President presided over the surgical section, and the Second Vice-President over the medical section. The President of the Association presided over the general sessions. The society was also divided into a medical and surgical section at Indianapolis in 1893, Detroit in 1895, Louisville in 1897, and Chicago in 1899. Among the notable meetings may be mentioned the Vincennes meeting in 1875, when the society was organized; Indianapolis meeting in 1883, when the present name was adopted, and the Cincinnati meeting in 1892, at which time the increase in the society's work necessitated dividing the sections. Among other notable meetings may be mentioned the meeting of 1894 at Hot Springs, Ark., and that of Detroit in 1895, and Louisville in 1897, and the great meeting recently held in Chicago.

ADDRESS OF PRESIDENT.

BY DUNCAN EVE, M. D.,
NASHVILLE, TENN.

From my earliest recollection, the science of medicine was to me a charm and a fascination, as presenting instrumentalities, agencies and opportunities of greatest good to the human family. Hence I should be singularly unappreciative if I did not esteem the honor of presiding over the deliberations of this august body, assembled from the various States composed of and bordering the great Mississippi Valley, to advance our noble calling and thereby promote the happiness of our fellow man, as one of the most grateful of my life.

Thus influenced, it is but natural that I should now wish to suggest something that, perchance, might be useful and pleasingly remembered.

The sciences of medicine and law are confluent and blend in the splendid duality of Medical Jurisprudence, and it is to be regretted that so few members of the two professions give this subject the attention which its importance demands. A knowledge of this science is imperative, and should be understood by every physician and surgeon for his own safety and protection.

A discussion of this subject would be especially appropriate in Chicago, where, notwithstanding the medical profession takes the front rank, and is distinguished for names that can never be forgotten, yet its members are tortured to martyrdom by suits for malpractice,

> "Thick as autumnal leaves that strow the brooks
> In Vallombrosa,"

or blackberries in a Southern "brier-patch." You might infer that my sympathy in this respect is natural from a similar experience. This inference is correct. Yet, in a rather large and varied experience, I have never lost a suit or compromised a case.

I will, therefore, attempt to offer some thoughts on Mal-

practice and the Damage Suit, on which subject I had the pleasure of presenting a paper four years ago to the Tennessee State Medical Society.

Strange as it may appear, no systematic work gives a formal or technical definition of Malpractice. I must, therefore, quote from a well known jurist on this subject: "Malpractice is the unskillful or negligent treatment of a patient by a physician or surgeon, or some one undertaking to act as such, resulting in injury to the patient."

To constitute malpractice, unskillfulness and injury, or negligence and injury, to the patient must concur. The inquiry is natural, "What is meant by unskillfulness?" It is the want or absence of learning and experience in medical science. How much skill is required? The answer is: "Ordinary skill." What is ordinary skill? Such skill as is usually possessed by the profession at the time and place when and where the patient is treated. This is what the law terms reasonable and competent skill in medicine. What is ordinary skill now would have been extraordinary, wonderful, incredible skill half a century ago. Oh! that I had time to speak of the triumphs and glories of Medicine and Surgery! How inspiring the theme, how it thrills and begs for utterance! But I must leave that for some one of talent, who can do this subject justice.

A doctor may be practicing in a sparsely settled country, and, however well he may be informed in the theory of his profession, he has not the means and opportunities of observation, experience and association presented in a city. Hence the reasonableness of the rule which does not hold him to as rigid accountability as one more fortunately located.

A physician may *legally* contract for extraordinary skill, and the law will hold him to his contract, but the code of medical ethics wisely forbids such agreement. He is required to exercise ordinary diligence in the treatment of his patients, though he could legally contract for greater attention.

What reasonable diligence is, in contradistinction to neglect, depends upon the nature of the disease or affection and the conditions and circumstances surrounding the case. For example, diligence in chronic rheumatism would be gross neglect in iritis, as Ellwell illustrates.

Contracts are expressed or implied: Expressed, where agreed between the parties; implied, when inferred by the law from the facts and circumstances. The physician or surgeon who opens an office or holds himself out to the community as practicing, impliedly contracts for the possession of ordinary skill, and promises the exercise of reasonable diligence. He impliedly says to the patient, I am able to treat you and will not neglect you. When a patient, or his friend or his relative, calls such a physician or surgeon, he by implication promises to pay the usual and reasonable fee, without a word being said on the subject. The contract for the amount of the fee, the time of payment, etc., may be fixed by the parties. The fee, however, is due when the services are rendered, unless otherwise agreed.

A physician or surgeon is not to be judged by results. He is not an insurer, unless, in violation of medical ethics, he, by express contract, becomes such.

When he possesses ordinary skill, and exercises reasonable care and diligence, no recovery for damages can be had against him. This constitutes his whole duty.

In evidence of skill, he has the right to prove that he is a graduate of a reputable school, and to have established his reputation and standing by the evidence of his professional brethren. Even if there be not ordinary skill and diligence, the patient can not recover, if no injury results therefrom.

If a person undertakes to act as a physician or surgeon, though he be neither, he is held accountable for any injury he thus causes.

A patient is compelled to co-operate with his physician in the treatment of the case. He must obey instructions, no matter if to do so is painful, or whatever the excuse, the physician can not be made responsible for injuries resulting from such disobedience on the part of the patient.

In cases of doubt and uncertainty, where the profession and authorities are not agreed as to treatment, the medical attendant *must exercise his own best judgment.*

A physician *can* decline to attend a patient for reasons satisfactory to himself; nor is he required to give his reasons therefor. He is not a common carrier, hotel-keeper, or "yellow dog," but has the same rights and privileges as

other professional gentlemen. The opposite opinion seems sometimes to be entertained by the community. A greater error could not prevail. Having, however, accepted a case, he must continue treatment until recovery or death terminates the relation, or the patient discharges him.

Pauper patients require the same skill and diligence as pay-patients. Our profession is justly distinguished for its charity and gratuitous treatment of the poor, yet most of the suits for alleged malpractice are brought by pauper patients, and of all, they are the most critical and exacting, and the least grateful. This is discouraging; nevertheless it is a fact.

A well known authority declares that two-thirds of the cases charging malpractice arise from *fractures and dislocations*. *Deformity* is the result of many fractures and cannot be prevented. Patients who have had the very best treatment for fractured collar bones, Colles' fractures, etc., consult with doctors until they find one who will express an unfavorable opinion as to the plan of treatment adopted, or at least suggests that a better result could have been obtained. With this opinion, *patients* advise with lawyers and a suit for malpractice is instituted. Unfortunately enmity, jealousy and rivalry are too often the cause of damage suits. A doctor is usually "*at the bottom of it.*"

Professor Austin Flint, Sr., abandoned the practice of surgery, and confined himself exclusively to the practice of medicine, because of the danger arising from damage suits. It does really seem that the safest course for a surgeon to pursue—not knowing what a jury might do—is to make over his property to his family.

The consent of a patient to an operation does not absolve the surgeon from responsibility; his duties and relations remain unaltered thereby. When he possesses the necessary qualifications and performs the duties required, he is not held responsible for mere errors of judgment; nor is he liable for declining professional assistance or consultation.

Owing to the fact that members of our profession do not make it a rule to learn their rights and duties to their patients, and, reciprocally, those of their patients to them, they subject themselves to the continuous anxiety of doubt

and uncertainty as to what they ought to do, or ought not to do; or what they ought to have done, or ought not to have done; and hence throw themselves unreservedly upon their lawyers for direction and instruction. Now, while it is well to retain counsel with whom they can advise, yet it should be remembered that the lawyer must investigate before he can decide, and it often happens that the lawyer is not himself a medical jurist, and he as much needs instruction as the doctor. Besides this, it is in emergencies needing immediate action that one must use this knowledge.

A well known medico-legal work, which is authority both in this country and England, lays down the following rules as established, to-wit:—

"(1). A physician or surgeon, without a special contract for that purpose, is never considered as warranting a cure.

"(2). His contract, as implied in law is: (a) he must possess a reasonable degree of learning, skill and experience, which is ordinarily possessed by others around him, in his profession; (b) that he will use reasonable and ordinary care and diligence in the treatment of the case committed to him; (c) that he will use his best judgment in all cases of doubt as to the best course of treatment.

"(3). He is not responsible for want of success, unless it is proved to result from want of ordinary skill, or from want of ordinary care and attention.

"(4). He is not presumed to engage for extraordinary skill, care and attention.

"(5). He is not responsible for errors of judgment, or mere mistakes in matters of doubt and uncertainty."

It must not be inferred that the degree of care and skill necessary to be exercised in a particular case must be proportionate to the severity of the case. Such a doctrine has been urged, but has been very wisely rejected by the courts. If such a rule were adopted, the conclusion would naturally and logically follow that a physician and surgeon is legally required to exercise care and skill adequate to the severity of all cases that he undertakes. Such a test is manifestly absurd and beyond the possibility of human acquirement.

It is as culpable to compromise a suit for malpractice when in the right as it is to resist when seldom in the wrong.

Such compromises not only subject innocent men to grievous sacrifices, but encourage the bringing of similar suits against members of the profession.

It is the duty of the physician to give needful instructions for the care and attention of the patient during his absence or between visits. A failure to do so would give a right of action in the courts. Upon this point, Arthur N. Taylor, LL. B., who has lately presented a series of articles on "The Law in its Relations to Physicians" in the *New York Medical Journal*, suggests: "This obligation extends not only to giving instructions for the period during which the physician is attending the patient, but also for the period of convalescence immediately following. Therefore a physician should, upon dismissing his patients, carefully tell them what to avoid, and advise them to exercise that care which in his judgment is best calculated to restore their natural health and strength."

By prescribing certain qualifications and attainments as conditions precedent to admission into the medical profession and by defining the duties and obligations, the rights and privileges of its members, much good could be accomplished by the law-making power of the country. With this assistance we could the more easily establish and maintain honorable medicine, rebuke the ignorant pretender, repress empiricism, and bring to justice the presumptuous charlatan: while resisting cruel and wanton attacks upon meritorious members of the profession, and defeating vexatious and oppressive actions instituted by reckless and unscrupulous parties for purposes of speculation and persecution.

Let the profession as a unit stand by the innocent victim when unjustly attacked, as if it were a matter of personal concern to each, remembering that when one member suffers, the reflex action is felt by all.

In harmony there is life; in union there is strength—Kentucky's motto should be our maxim: "United we stand, divided we fall." Our profession should be and is a fraternity, illustrating a glorious brotherhood in all its relations, bearings and dependencies.

> "A wise physician, skilled our wounds to heal
> Is more than armies to the public weal."

The very name of Medical Science is suggestive of living thought, noble deeds, high morals, generous sacrifice, and benevolent action, whose remaining charities, after feeding multitudes, fill to repletion the baskets of humanity and philanthropy; a profession possessing an incalculable force of restorative and re-creative energy; whose Materia Medica comprehends earth, air, and sky; and whose Therapeutics levies contributions upon the three kingdoms of physical science.

History announced an indubitable fact and Philosophy exclaimed, "The nation that shortens its sword enlarges its empire."

Medical Science has reduced the sword to the dimensions of the scalpel, and moulded the bayonet into a tenaculum. Hence, its empire comprehends the nations of the globe, and its soldiery rides the waves of every ocean, and walks the decks of the fleets of the world. This science has the earth for its theater and the people thereof are its *dramatis personæ* and "the drama of its attendant revelations" signalizes the splendor of its achievements.

Therefore, with a heart over-flowing with fraternal felicitations, I congratulate you upon being faithful, zealous members of this great and glorious profession, and joyously express at once the hope and belief that your presence and your deliberations in this great city will be productive of good to the cause in which we are so heartily enlisted.

ADDRESS IN MEDICINE—TYPHOID FEVER.

BY J. A. WITHERSPOON, M. D.,
NASHVILLE, TENN.

MR. PRESIDENT AND FELLOWS OF THE MISSISSIPPI VALLEY MEDICAL ASSOCIATION:—In selecting a subject upon which to address you in general medicine, I have thought it proper to select one common to us all, and especially one, while important, upon which from the various sources of treatment we have such a diversity of opinion. I desire to state, gentlemen, that in this day of progressive medicine, when the whole profession is anxious to elucidate the etiology of disease and its prevention, no field has been so thoroughly gone over, and no trials or hardships have been so difficult as the study of the plain, old-fashioned disease—typhoid fever. While the laboratories, with their facilities for the study of pathogenic micro-organisms, developed in the last few years, have made wonderful progress, I belong to that school which believes that while the diagnosis should still be made with the assistance of bacteriological investigation, it should be made clinically at the bedside. [Applause.] In other words, I am opposed to doing away with the good old-fashioned methods of examining the patient, and absolutely relegating that system of our fathers to the rear and making diagnoses in the laboratory. While I realize that in this age of progress the students of bacteriology and of chemistry have done a great deal for us, I think it will be a bad day for the records of medicine when we relegate the good, old-fashioned family doctor to the rear as an old fogy, because he paved the way that made it possible for us to occupy the positions we do to-day. [Applause.] There will never come the time in the history of this country when the old family doctor, with his self-denial and hardships, will be prevented from becoming a member of each and every family he practices for, and it should never get to that pass in my opinion.

Now, in the discussion of typhoid fever, we all know that it is a specific toxemia; that it is produced by the typhotoxins

elaborated in the system from the bacillus of Eberth. This has been thoroughly demonstrated. We know that it has certain suitable soils in the system in which it is planted, and where it meets a suitable pabulum for its growth and development. It would be useless for me to state that this little bacillus is, in the majority of cases, taken into the system through the alimentary tract; that while it is not impossibe for the inhalation of this poison to produce typhoid fever, yet it is one of the rarest forms of infection. But bad sewerage, bad water, infected milk, infected food stuffs, play a very important part in the growth and production of this germ, and through these media the infection of the system occurs.

Now, gentlemen, I shall only discuss the pathology in so far as it will have a bearing upon some of the differentiations I hope to bring before you.

In the first place, when this germ is taken into the alimentary tract, it is unaffected in the stomach. It passes through until it reaches the alimentary tract, where it can enter its proper habitat and meet its proper pabulum for elaboration, growth, sporulation, and the giving off of its toxin, namely, the lymphoid structures of the bowel. When this germ has penetrated to the lymphoid structures, especially in the lower part of the ileum, there it meets its proper food stuff; but before this, it has created a hyperemia together with congestion of the entire alimentary tract. This is not limited to the ileum, but may extend to the jejunum and duodenum, and frequently invades the colon itself. The point I want to impress upon you this morning (we all know it pathologically, but we do not recognize it in treatment) is the fact that these germs do not remain in the alimentary tract at all; that they pass into the lymphoid structure, and from it are disseminated throughout the body. They are found in the spleen, in the mesenteric glands; they are found in the rose-colored spots; they are eliminated by the urine. They are found in every tissue of the body.

I want to impress that fact because it has a strong bearing upon the treatment of typhoid fever. The ulcerative changes following the hyperemia of Peyer's patches, so well known, are nothing but the action of necrosis. These changes are

produced by a two-fold effect; one is the cutting off of the circulation of the part from the infiltration of cells, the other is the specific action of the typhoid bacillus itself. These changes remain local; they are entirely local manifestations of the already constitutional affection. After the system has become involved, after the general toxemia, I claim, gentlemen, to undertake to treat typhoid fever locally is worse than useless. Now, to come rapidly to the principal features I intended to address you upon this morning.

What is the reason for the reports of such wonderful results from local treatment? We find every day good, honest men in the profession who have reported hundreds of cases cured of typhoid fever by the aid of intestinal antisepsis. We find others reporting wonderful cures by purgation. My point is, that there is in my opinion a reason for these cures; that the gentlemen do have the results they report, but in my humble judgment they are not treating typhoid fever. I make the broad statement upon my own study of the subject, that in this Mississippi Valley, and possibly elsewhere, we are treating three forms of fever, not two. I am perfectly well aware that the authorities deal practically with two great forms of fever—typhoid fever and malarial fever. I am well aware that, according to Sternberg's recent study of the subject, our army in returning from Cuba had only malaria and typhoid, these being the only diseases found. While I do not doubt the statistics of any man, yet I do say that clinically, and by the very best evidence I have been able to bring in microscopical and chemical analyses, we do have a third fever. What this fever is, I am free to confess, I am unable to say; its cause, whether it is due to some specific micro-organism in the bowel or to an auto-intoxication, I do not know. I have referred to it as a *toxenteric fever*, receiving its poison from the intestinal canal.

Let us for a moment draw distinctions clinically between this fever and typhoid fever. So far as malarial fever is concerned, at this day we should not mistake it. Not only the clinical symptomatology of malarial fever is definite, but the microscopic examination of the blood and of the discovery of the plasmodium should be absolutely pathognomonic of this fever, and we should not allow it to confuse us with the

other fevers. In the first place, typhoid fever is a slow, gradually developing fever. We find it with a period of incubation of about ten days, varying, of course. We find in toxenteric fever a rapidly developing fever, with a short incubative period. We find in the incubative period of typhoid fever nosebleed, lethargy, stupidity of intellect, anorexia, a tired, worn-out feeling, associated with headache, backache, and all of the well known prodromata of typhoid. We find toxenteric fever coming on like a storm. The patient is perfectly well to-day; is taken either with a hard chill or slight rigor at night, and the temperature immediately reaches the zenith of its power—104° to 106°. One commences slowly, the other quickly. We find typhoid fever, in the majority of cases, associated with slight constipation, but with a tendency toward diarrhea, responding very quickly to laxatives. With toxenteric fever you have constipation throughout the entire attack, associated with hard, scybalous masses from the bowel, and a fermentative diarrhea if purged too much; whereas in typhoid fever we have the mushy stool, with that peculiar odor, which is never perceived in toxenteric fever; we have in typhoid fever the headache, backache, the limbache, which rapidly pass off. In this fever we have soreness of the entire muscular system, going and coming, frequently of a neuralgic character. The pain is uncertain as to its locality, or as to when it will appear. It may come at any time. We find the flushed countenance, that dull, listless indifference, in the facies of typhoid fever. In this fever we find the pale, anxious expression, a peculiar pale skin. The patient is always irritable, calling for things without the necessity for them, so different from that complete hebetude and lack of desire for everything seen in typhoid fever. We find in typhoid fever the pointed, red-edged tongue, with a tendency toward dryness. In this fever we find the tongue not enlarged, never pointed, pale blue or white coating, with marked papillae showing throughout, with moisture throughout the entire attack. In typhoid fever we have complete absence of appetite; in this fever the appetite is irregular; frequently patients are hungry throughout the entire course of the disease. In typhoid fever we have a hacking cough, associated with bronchial complication, which is always seen

in typhoid fever. In this fever cough is never present, and I have never seen the complication of the respiratory system in it. In typhoid fever we have tenderness in the right iliac fossa, with gurgling in the ileo-cecal valve. In this fever we have slight epigastric tenderness, occasionally slight tenderness over the sigmoid flexure. In typhoid fever there is a tendency toward tympanites or meteorism. In this fever we have a rather flat or scaphoid abdomen without tympany, unless the case is badly or over-treated. In typhoid fever there is a peculiar odor which emanates from the body; this I have never detected in this fever. I am aware of the fact that under the present methods of treatment of typhoid it is not common for us to have this odor, yet the slightest neglect for a day will bring it; it is so characteristic that general practitioners, after having once smelt it, never forget it. This is not true of toxenteric fever. In tyhpoid fever we have an enlargement of the liver and the spleen; in toxenteric fever we do not have enlargement of either of these organs. Even with the most careful palpation and percussion we are unable to elicit enlargement. In typhoid fever we have Widal's reaction, which in the majority of cases, will show perfectly. In toxenteric fever I have never seen Widal's reaction respond, with but one exception, and that is, occasionally we will stop the motility of the organisms, but we never have clumping of these organisms. In typhoid fever we have no leucocytosis; in toxenteric fever, in over 50 per cent. of the cases leucocytosis is found. In typhoid fever cold water is the most grateful thing applied locally to these patients. Should you douche one of them suffering with toxenteric fever with ice water or place them in a cold bath, there will be a rigor and fever. The temperature will go higher afterwards. These patients do not tolerate cold well, but warm water is grateful to them. I do not know the experience of other men, but I never saw fever blisters or herpes labialis on the lips of a typical typhoid fever patient. You will find this condition in almost every case of toxenteric fever. I now come to the fever itself.

You know the gradual, step-ladder course of the fever of typhoid; it rises by gradual ascent, a slightly lowered temperature in the morning, elevation in the afternoon, and

during the first week it creeps step by step upon its victim without being influenced by medication or antipyretics other than temporarily. But with this fever, you will have a temperature of 105°, may be going up in an hour or two, and possibly this afternoon a temperature of 102°. At night it may run to 104°, and to-morrow morning, at two o'clock, it may be normal or subnormal. In other words, this fever is one of the most erratic, so far as the temperature chart shows, that I have ever seen, and I am not speaking theoretically. I have chart after chart kept by competent nurses that will show you a temperature chart exactly like that of septic fever, associated with drenching sweats. Now, in my humble judgment, typhoid fever never pursues this course. While you may have a variation in temperature from the application of the cold pack, the Brand method of treatment, or by antipyretics, or the coal tar derivatives, which are pernicious in these cases, you may have marked fluctuation, but not so in toxenteric fever. I have left at home half a dozen cases of this type of fever. One a young lady in whom the temperature was 104° at nine o'clock; at eleven o'clock it was 97°. You say, doctor, you have had a hemorrhage from the bowel, and that is what I feared. It is nothing of the sort. With the fall in temperature the pulse comes down to 80°, usually of good volume. The abdomen shows no bloating or tympany, there being absolutely no sign or symptom of peritonitis or rupture. Possibly the temperature may become normal at the end of two or three hours, and then rise again. I maintain that if this type of fever, which is seen in our locality in the vast majority of cases, is true typhoid fever, then the history of typhoid fever must be rewritten by the masters. It is absolutely different in every particular. For instance, typhoid fever is more common in young adult life; toxenteric fever shows no respect to any age. One attack of typhoid fever will render the majority of people immune from subsequent attacks; while toxenteric fever will predispose to another attack. You say, this fluctuating temperature is nothing but malaria. My experience with malaria is that it is fast receding in the number of cases. In our section of the country malarial fever exists; the old-fashioned intermittent and remittent types still occur,

but they are not so prevalent as they used to be. Out of tests of nearly every one of these cases for the plasmodium of Laveran, I have been unable to find it. Not only that, the most expert microscopists have given reports of no malarial fever poisoning. A gentleman in the medical section said that quinine would control any malarial fever. Gentlemen, I gave a case of this sort 120 grains of quinine one morning between six and twelve o'clock, and it had no effect except to render my patient violently nervous. Quinine will have no effect upon toxenteric fever—absolutely none, hypodermatically administered or otherwise. Now, this fever will run its course in two or three weeks if let alone. Typhoid fever runs its natural course, as you all know so well. I maintain that the good results gotten by purgation and intestinal antisepsis are due to the fact that physicians are managing toxenteric fever, and not typical typhoid fever. A great many men have answered me by saying, "I found the bacillus typhosus in the stools." I want to say this much to you, that while I am a general practitioner of medicine, I have some knowledge of microscopical methods. In the first place, the bacillus typhosus of Eberth is not found in the fecal discharges until after the tenth day—very rarely. It takes an expert microscopist to develop colonies of this germ properly, and then it takes an expert to differentiate it from the colon bacillus when you do find it. Therefore I do not give much credence to the statement that this germ is found by general practitioners.

One other point in reference to this fever which is so prevalent in our country, and upon which there is such a difference of opinion, which has been the source of a great deal of discussion: I have never seen a complication from toxenteric fever when it was properly treated, or when the physician did not over-treat it. Therefore, deaths from it are very rare, and the missing link in the differentiation is largely from want of *post-mortem* investigation. A death is so rare from this disease, if it is properly managed, that it is impossible to get a *post-mortem*.

I wish to discuss for a few moments, and I shall not detain you long, the various treatments of typhoid fever. We find one element of the profession reporting wonderful results

from purgation. Gentlemen, I appeal to the reason of the doctor. When the ileum is ulcerated in a case of typhoid fever, the practitioner must know that there is a follicular enlargement throughout that bowel. He must know that the ulceration in the ileum may be all the way from a slight hyperemia to a sloughing eschar, or a deep ulcer, and the practitioner can not tell whether the ulcer is simply on the submucous structure or the muscular coat, or whether it has already thinned itself out until there is nothing but a slight peritoneal layer which saves the life of the patient. Therefore, I say, I am not bold enough, nor do I think it good practice, after the first week of typhoid fever, to purge these patients incessantly, trying to get rid of germs in the bowel which have already disseminated themselves throughout the entire system. In my experience the cases of typhoid fever which do best are those which are mildly constipated throughout the attack. Of course, the bowels can be moved with an enema, but do not resort to hyper-purgation.

The great complications of typhoid fever are hemorrhage and perforation. If those are the complications to be feared, then purgation will render them more liable to hemorrhage and perforation, hence I do not believe in purgation in typhoid fever. We all give a purgative first when we do not know what is the matter, and I believe in enemas to move the bowels after the first week.

We come now to the so-called specific treatment of typhoid fever—intestinal antisepsis. I do not desire to refer to any man's treatment, but I do say that the man has never lived who can get up prescription No. 1, and formulæ Nos. 2 and 3, have them made in Detroit or any other city, and tell me how to treat a case of typhoid fever in the active stage of the disease in Nashville. I am unalterably opposed to any man putting up my prescriptions for me. But let us speak of intestinal antisepsis. Did you ever stop to think of your school-boy days, when you were taught that the alimentary tract is about thirty feet long? Have you ever thought what two grains of guiacol, or any other antiseptic, would do toward disinfecting this tract and overcoming the germs along the course of these thirty feet after being mixed with the secretions of the bowel? Intestinal antisepsis, administered

in the size doses usually given, is a delusion and a snare in the majority of cases, so that they are capable of being passed through the stomach, can enter the bowel and do wonderful work toward overcoming the bacillus and various poisons found there. You are attacking the enemy, gentlemen, long after he has evacuated that road. He has already passed into the circulation. The blood is full of germs: Do you mean to tell me that guiacol, thymol, salol, and all such drugs are going to get rid of the enemy (the germ) and drive him out of the blood vessels and other parts of the body? It is not possible to do so, gentlemen. Therefore, the only good intestinal antiseptics can do is simply to assist in rendering the alimentary tract clean. They can exert no good on the specific toxemia. Therefore I simply take my individual standpoint; I have never become so great that I have tried to influence the medical profession on any question. It is entirely with every man to decide for himself, but so far as my individual opinion goes, I think it is the height of folly to speak of the treatment of typhoid fever by intestinal antisepsis.

Now, then, what is the treatment for typhoid fever? What is the treatment that is based upon the principles of pathology, as well as the experience of the masters and of those of us who are still sitting at their feet? The first great principle in the treatment of typhoid fever is absolute rest. Not long ago I heard a gentleman read a paper in which he said he gave his typhoid fever patients purgatives and allowed them to get up to go to stool, walk around where they pleased, and, what was more, do what they pleased. All I have got to say regarding the man who treats cases of typhoid fever in that manner is this, that the same divine hand that tempers the wind to the shorn lamb takes care of his patients. Keep the patient at rest in bed. The next important feature is to have a well ventilated room; have a nurse who knows the great principles of cleanliness, and see that they are carried out to the letter. I shall not enter into details. But I do think that it is important for the physician to write down these details and have a chart for the nurses to go by.

What is the next great principle? The next great

principle is to prevent the poison from absolutely throttling the life of the patient.

Let us speak of another feature, namely, lowering of the temperature by the coal tar derivatives. The action of these coal tar derivatives on a patient is to lower temperature, to depress the vital forces, it matters not what may be the method. With a fatty heart, with a parenchymatous change in the various organs, with a disease that runs a course of from four to five weeks, the great tendency of which is to lower the vitality and to depress vital resistance, I am afraid to use any drug that will add to that. Therefore I am opposed to the use of any coal tar derivatives to lower temperature, because they are deceptive; they simply force down the fever too rapidly, and lower the vitality of the patient. In the next place, they are adding fuel to the fire, and we are to meet the conditions we produce later on. In the third place, there are methods so much superior for the handling of the toxemia and the elevation of temperature, that these measures should not be considered at all. The great principle of the treatment of typhoid fever, in addition to the rest I have spoken of, is to treat it symptomatically. Treat it according to your own good common sense. I never saw any two patients that could be treated exactly alike—never in my life—and I think our success in the practice of medicine is by properly grasping the situation and a knowledge of meeting emergencies as they arise. The only treatment which I believe is applicable in typhoid fever, as a whole, is the cold-water method of treatment. Now, you say, shall you follow Brand's method? I do not. In other words, I do not follow his method because he says when the temperature reaches 102½° put the patient in a cold bath. There is no man in this world who can place a line of demarkation between a moderate fever and high fever in any two patients. A temperature of 102½° will bring about marked delirium in one patient; in another it will have no effect whatever. I do not confine myself to any one plan of treatment, but am governed largely by the condition of the toxemia. If I can not use Brand's method, or the cold bath, then I resort to cold-water sponging, and plenty of it, on the outside of the body. I let these patients drink plenty of water. I believe

this is the best method with which to handle cases of typhoid fever. You may ask, how are you going to meet the restlessness, the tossing, rolling of the patient, without sleep? With opium? No. I am opposed to opiates in typhoid fever except in one condition, and that is hemorrhage. If you simply take a patient, put him in a bathtub and sponge him off, you will soon cool him down, and the sedation of the nervous system will wrap him in the arms of sleep, "balmy sleep, that knits up the raveled sleeves of care," and he will awake much refreshed, with a strong pulse, and always better afterwards. If you put such a patient under the influence of opium, then you absolutely obscure the bowel complications; you increase the meteorism; you have a more tympanitic abdomen, a dryer tongue; you have every sensibility perverted, and I am opposed to it. I am likewise opposed to chloral and the various hypnotics for the same reason of depression of the vital forces. Take a patient with the old-fashioned symptoms of typhoid fever which we rarely see now, namely, a dry, brown tongue, with sordes upon the teeth, a dicrotic pulse, with a deep, muttering delirium, and you see him lying there, reaching out his hands and bringing in invisible objects and examining them with all the care and interest as if they were precious jewels; you see him lying frequently looking into the distance with the eyes fixed, deeply unconscious, possibly with a smile upon his face, waiting for some spirit to come and waft him to another world—and he is almost ready to go, too—we do not see this now. Why? Because the new method of sponging or of bathing typhoid patients has almost eliminated it. But if you do have this dry tongue, the meteorism, the marked tympany of the abdomen, then I want to go on record as saying that I still adhere to that time-honored remedy—turpentine. I believe that it will do more with a dry tongue, a tympanitic abdomen, and with a flagging pulse than any other one remedy we can use, when associated with the cold bathing I have just described.

In toxenteric fever, I want to say to you that I have treated case after case without a dose of medicine, except a purgative. You can give them purgatives; put them on beef juice, avoiding milk in the majority of cases, and the disease runs

its course in from twelve to eighteen days. In typhoid fever I have never been able to cut it short one day. I have seen cases of so-called aborted typhoid fever, but I want to say that the doctor who thinks he has aborted a case of typhoid fever is mistaken, and that if such a case is aborted, then it is done by the grace of God, and not by any treatment he may have used. I do not believe in aborted typhoid fever, but I do believe in watching fever closely and carefully, and by good nursing and very little turpentine the majority of cases will pass safely through the crisis and be relieved without any trouble or complications. Dangerous complications should always be carefully avoided.

Gentlemen, I have made this talk entirely without notes, simply because it was my desire to talk to the general practitioner. I wanted to talk fever as I see it, and not as it is written in books, and when the general practitioner learns to treat fevers according to bedside experience, then we will have stopped shaking the persimmon tree for the specialist to eat them when they fall on the ground.

ADDRESS IN SURGERY.

THE ESSENTIAL REQUIREMENTS OF A MODERN SURGICAL PROCEDURE.

BY LEWIS S. M'MURTRY, A. M., M. D.,
LOUISVILLE, KY.

MR. PRESIDENT AND GENTLEMEN:—The address in surgery on such an occasion as the present usually consists in an epitome of recent progress in the science and art of surgery, or in the presentation of recent investigation in surgical pathology or some newly devised operative procedure. The time allotted will not permit the analysis of statistics or the details of experimental investigation, but rather invites the discussion of some practical subject. Especially does the latter plan commend itself to us when we consider that the greater number of our members are general practitioners of medicine and surgery, assembled here for the mutual interchange of views upon practical topics of daily interest and concern. Recognizing this fact, I have selected for the subject of this address "The Essential Requirements of a Modern Surgical Procedure," and trust that the consideration of so elementary a topic may not be without profit and interest. To the hospital surgeon my discourse will offer nothing new, and it may be that my remarks will be of scant interest. I indulge the hope, however, that to the busy practitioner, practicing for the greater part in private homes, a discussion of such a subject may be of some practical interest.

Within the past fifteen years the province and scope of surgery have been greatly enlarged. Many diseases and injuries formerly treated by expectancy and palliative measures, with little hope of permanent relief and cure, are now promptly and radically cured by judicious surgical intervention. Not only is this recognized by our profession,

both individually and as a body, but the laity have become so familiar with the brilliant results of modern surgery as to readily accept such treatment when proposed, and even to invite and welcome a resort to surgery when proffered. Notwithstanding the increase in hospital facilities in cities and towns, many important surgical cases must receive attention immediately and at the hands of the family physician, from the very nature and urgency of the disease or accident. Such cases are classified as emergencies, and they include many of major as well as of minor character. In the recital of such cases in our societies, as well as in their report in our journals, it is customary to deal at length with symptoms and diagnosis, pathological character and etiology, while the operative procedure is dismissed in two or three words. And again, in both didactic and demonstrative description of surgical technique, individual fancy includes so much that is unessential that great diversity of practice and confusion of opinion prevail as to the essential requirements of an aseptic surgical operation. This fact is amply illustrated in the varied estimate attached to chemical antiseptic agents in surgical work. The truth is that such germicides as bichloride of mercury and carbolic acid have long been limited in their application to a minor and subsidiary office in obtaining and maintaining asepsis in operative surgery, yet by many they are still regarded as the essential and primal agents in eliminating septic agencies. For these reasons, and on account of recent progress in perfecting and simplifying the modern surgical technique, it seems appropriate to invite your attention upon this occasion to a consideration of the essentials of a modern aseptic surgical operation. Without a thorough appreciation of these, the results which have elicited our admiration and yielded such beneficence can not be obtained. Indeed, here will be found the practical application of surgical knowledge and skill.

In all conditions, when a surgical procedure is to be carried out, whether it means a minor or major operation; whether it means an incision for the removal of a superficial foreign body; whether it means a mere changing of dressings from the operative wound, certain fundamental principles of asepsis should be observed; and yet we know that it is

comparatively exceptional in private homes for these minor surgical procedures to be carried out without the appearance of pus following such operations. In any surgical operation that is performed there are three important steps to be observed. The first is the administration of the anesthetic. This is so intimately connected with the entire phenomena of shock that it becomes a matter of the greatest importance and concern; and the perfection with which anesthetics are now administered by the medical profession is really astonishing, as attested by the uniformity of its success. When we consider that chloroform and ether are administered in every village, and town, and city, thousands of times daily, and the small number of accidents reported by coroners' investigations in the daily prints, it is wonderful that the administration of a remedy of such power is accompanied by so few fatal results. Yet I feel that you will concur with me when I say that the administration of an anesthetic for a surgical operation requires skill that is acquired by practice, and hence I take occasion to say here, in passing, that in all of our medical schools there should be done what is done for the internes in our hospitals, namely, give all pupils practical instruction in the administration of anesthetics. This instruction should be given by a competent teacher, something that is done in but a few of the institutions of this country. A great deal of the success of a surgical operation depends upon the administration of the anesthetic, for prolonged anesthesia and exposure are of serious import in their relations to post-operative shock.

The second element of a surgical procedure, requiring the attention of everybody engaged in such work, is the control of hemorrhage during the operation; the preparation for this before the operation begins. In the early days of abdominal surgery it was common to disregard the question of hemorrhage. All gentlemen who have done this work, and who are present, will remember the days when the drainage tube was much more frequently used than it is now, and how, at the end of forty-eight hours, it was customary to pump out large quantities of blood, the result of oozing from small vessels, internally, in the operation. Nowadays, when more attention is being given to hemostasis as the operation pro-

ceeds, hemorrhage is lessened, and the difference to the patient is great. The difference in results is great. In complicated, serious surgical operations the scale may be turned by the loss of a small quantity of blood, and the operative surgeon, when post-operative hemorrhage takes place, will recognize the fact that it is astonishing how small an amount of hemorrhage may be found *post mortem* which has been the cause of the death of the patient. Hence the use of hemostatic forceps in the operative procedure. The use of the animal ligature in securing small vessels has become a great feature, and greater attention to hemostasis in all surgical operations should be more generally observed than it is at present; hence, I say, the second indication of a modern operative procedure is to pay attention to the important matter of hemorrhage from the beginning to the completion of the operation. Hundreds of operative cases that have resulted fatally have been classified as shock, in which the fatality was due to acute anemia that follows persistent hemorrhage from comparatively small vessels.

Then, a third indication, and the one to which I desire to devote the remainder of my remarks, is the important matter of asepsis—the prevention of septic infection. It has not been a great while since gentlemen in our medical societies indulged in prolonged discussions—and I may say combative discussions—about the comparative merits of asepsis and antisepsis, about the value of certain chemical agents, and as to whether or not micro-organisms sustained any causative relation whatever to putrefaction and suppuration. So distinguished a surgeon as Bantock, of London, disclaims and repudiates the Listerian doctrine, and says that it will be proved that the micro-organisms that are found in suppurative conditions are the result of the suppurative process rather than the cause; hence I may be pardoned for alluding to such an established question as the Listerian system, although I am glad to say that in our country these discussions have all passed away. No one with whom I am acquainted any more doubts the relation of micro-organisms to suppuration than they do that a telegraphic message can be sent from Chicago to New York. Its presence has been demonstrated, consequently there can be no discussion in any

body of enlightened medical men upon this point. The entire Listerian system, which has made surgery the crowning glory of the nineteenth century, which has extended the domain of surgery into all cavities of the body and made it one of the greatest triumphs of science in any department, has attained its great perfection through the principles that were enunciated by Lister, amplified by the researches of Pasteur and Robert Koch, emanating from the simple observation of Mr. Lister that a simple fracture would heal without febrile disturbance, and that suppuration would take place if there were a wound of the skin admitting the atmospheric air, as he supposed, to the site of the injury. Based upon this observation, Lister sought Louis Pasteur, and following his studies upon putrefaction it was demonstrated clearly that micro-organisms were present upon ordinary objects, and especially abundant about hospitals, which were the cause of suppuration. Hence Lister in his first efforts at asepsis was carried away with the idea of destroying microbes, and his first arrangement to deal with the subject practically was with the spray, by which he attempted to so modify the atmosphere, which he regarded as the bearer of all means of infection, as to exclude it by mackintosh, gauze, and other material from the wound. All these things have been simplified, and I may be pardoned for a moment in pausing to say that the perfection of the aseptic surgical technique no more detracts from the great achievement of Lister than does the perfected Baldwin locomotive, which passes over our railroads, detract from the discoverer of steam as a means of locomotion. The principle of surgery as carried out in our hospitals to-day is the principle that was discovered and enunciated and established by Sir Joseph Lister. Now, we have an important step in advance of Lister's idea. Lister believed that the atmosphere was the great medium of infection. Now we know it requires contact; we know that the abdomen, the brain, joints and the chest may be opened in the ampitheatres of large hospitals, and patients placed in wards by the side of other surgical cases without becoming infected, provided there is a strict observance of essential precautions. The atmosphere is not the medium of con-

tagion and infection. We may expose any ordinary wounded surface for a reasonable length of time to the atmosphere and infection will not follow. The dirt about habitations, the dirt of our streets that permeates our clothing, and that finds a perfect nidus for the development of spores of infection upon our skins, is the great source of infection. Consequently the practitioner in treating a wound should remember that his energy should not be expended in dealing with atmospheric conditions; and while the environment of the patient should be as pure and as clean as possible, the great, important and essential matter for him to look to is that of contact of all objects of every character that come in close touch with the wound. In the next place, the patient should receive consideration in the preparation for the operation. In surgical work it is considered by some proper to have a patient going about his or her duties to-day and be operated upon a few hours afterward; that a patient can take a railroad journey this morning to undergo an operation this afternoon, whereas a patient preparatory to every operation of election should have careful preparation. Time does not permit me to elaborate this point, but I simply mention it in connection with the first elementary propositions I have submitted for your consideration.

The patient's bowels should be cleared out; the patient's diet should be restricted for two or three days to simple articles of food. The kidneys should be flushed by drinking an abundance of pure water. The skin should be made active by warm daily baths; the patient should be allowed to become accustomed to the bed by resting in it for two or three days prior to the operation, whenever this can be done. All these matters count for a great deal in convalescence; they count for a great deal in the comfort and safety to the patient in those operative procedures wherein the issues of life and death, of success and failure, are very evenly balanced.

I would call attention to the methods which should be observed in performing operations in private homes. This subject has been discussed at great length in special surgical societies, and for some time it was claimed by some that no surgical operation of any magnitude whatever should be undertaken unless it was in a hospital, with every

modern equipment and convenience. Now, we all concede that the best place for a surgical operation to be performed is in the modern surgical hospital. Nobody questions that. But are the beneficent offices of surgery to be limited to the comparatively minor element of the population who can reach such an operating theatre? Operations such as for appendicitis, for extra-uterine pregnancy, for gun-shot wounds, if they are to save the life of patients, often have to be done immediately. If a trained, skilled operator is not at hand with his corps of assistants and nurse it is to be done by the general practitioner, and these operations will be more and more done as time goes on by the general practitioner. Such operations, and I could name many others, must be done, and as our profession advances, and as surgery goes on attaining the high degree of perfection which it now shows, the province and scope of surgery will so increase that every practitioner will perform more and more serious operations.

Now, when it comes to performing an operation in a private home there is the greatest confusion of ideas in the profession as to how this should be done. Many think it is necessary to pull down all pictures, to pull up the carpets, and start with carbolic acid, hot water, etc., and scour the walls. This is all very well if you have time. Everything that can add to cleanliness about the place where a surgical operation is to be done should be carried out; but if an operation is to be done to-day nothing whatever should be done in the room that is to be the place for that operation. No dirt, no dust should be stirred up; no pictures should be pulled down. If the operation is to be done to-morrow or the next day there is ample time to clean, to purify the room so as to have the proper environment for operative procedure. But immediately before operation, say within twelve hours of it, it is an error to raise a cloud of dust and thereby facilitate the contact of some infectious material with the wound to be made. Everything should be kept away from the field of operation, except those things which the surgeon has brought with him.

In operations done in private homes the greatest care must be observed as to what is used as a part of the

operation. I mean by this basins, towels, tables, sheets, bedclothing—in short, everything that constitutes a part of the operative paraphernalia. These should be kept in readiness by every practitioner that attempts a surgical operation. They should be kept in readiness as a part of his own instruments. He should have towels especially prepared for the purpose that have never been used for toilet purposes; he should have basins (cheap) that are perfectly new and have never been used for toilet purposes. These should be employed in the operation. He should have all of his materials prepared in anticipation of a surgical operation and keep them in readiness. These things should be taken to the house of the patient by the surgeon himself; they should be properly prepared and ready for use.

The greatest difficulty in the way of maintaining asepsis in surgical operations, whether in the hospital or in a private home, whether it be an emergency operation or an operation of election, appertains to the cleansing of the skin.

I will not go into details about the preparation of instruments. The boiling of instruments is so satisfactory, so well known, so much the custom in office practice (but should be more so than it is) that I will not dwell upon that.

But skin disinfection is one of the most difficult problems we have to deal with. The general practitioner should, in anticipation of a surgical operation, whenever possible, begin the preparation of the patient's skin, the field of operation, twenty-four hours before the operation is to be done. The surgeon should begin the preparation of his hands all the time. Nails should be trimmed and worn short; hands should be cared for with a view to doing surgery. The hands should not be soft and tender; they should be accustomed to work, but they should be kept free from abrasions and taken care of with a view to doing surgery. Rings should be dispensed with by physicians and surgeons. All disinfection of the skin, the field of operation, and of the physician himself, should be done deliberately, instead of devoting a few minutes to it when the anesthetist is putting the patient under the influence of the anesthetic. Half an hour should be given to the process of skin disinfection. The surgeon's hands that go into the wound are the means

most common of carrying the germs of infection. Of course the patient's skin can only be imperfectly disinfected, yet it can be accomplished sufficiently for practical purposes. The researches of Welch have shown that the white staphylococcus is buried so deeply in the skin that even after scouring and scrubbing the hands with hot water, soap and brush, and immersing them in a solution of bichloride of mercury so strong as 1-500 for a considerable time, the washings from the hands will show that the skin disinfection has only been imperfectly done. Consequently it is conceded that absolute asepsis does not obtain; that it is impossible to so disinfect the skin of either the field of operation or the surgeon's hands as to have an absolute aseptic condition; yet the resistance of the blood to overcome a certain dose of poison of a microbic character, as has been shown also by Welch, can be relied upon. Consequently, even if skin disinfection attains only approximate perfection, this will practically suffice. Skin disinfection should be done with the greatest care. Soap, hot water and a good brush are the most essential means of attaining it. The great difficulty in relying upon germicidal solutions and upon rubber gloves is that these distract attention from the important point of thorough disinfection of the hands. Rubber gloves are, in my judgment, to play a conspicuous part in surgery, but they should not atone for omission of the important points in skin disinfection preparatory to any surgical procedure. The reason that so many infections occur in operative wounds that require repeated dressings, such, for example, as wounds which have had gauze or tubular drainage, and have required frequent changes of dressings, is because of the carelessness in the method of hand disinfection observed by the surgeon who makes these changes of dressings. It is considered that this is but a trivial procedure, consequently the same care is not observed as in the operation primarily. This should be done in order to maintain asepsis. Where we have such a culture bed as is furnished by drainage of blood clot and serum, we should be especially painstaking to cultivate hand disinfection. The best method of cleansing the hands is mechanical. It consists of the use of hot water, soap and brush. This should

be done thoroughly in running water, and it requires time; germicidal chemical solutions are used as an additional safeguard, but they are not absolutely essential.

The water used in a surgical operation deserves attention. The water should always be filtered and boiled, preparatory to its use in a surgical operation, in order to be sure that it will not be a source of conveying infectious material.

Next, in an operation, however great or small, an essential means of preventing infection consists in the dexterity of the operator himself, and in his keeping the operation itself entirely under his own control. Whenever we see an operation that has two sets of hands to take part in it, and which touch the operative area, the danger of infection is double, because it is not so easy to guarantee perfect asepsis of two sets of hands as of one.

For the same reason, all instruments that are not necessary should be eliminated. Operations that are done by several surgeons or assistants, one taking the place of another, almost invariably are followed by infection. The operator should be prepared to meet the issues of the operation; he should take the operation in hand at the start, and should keep it in his own hands to the exclusion of other things. He should acquire that skill and dexterity which enable him to keep away from the operative area everything of possible contact which could by any means carry infection. This is best done by doing the operation himself from beginning to end. Every one who operates should make an effort to acquire this skill, so as to require as little assistance as possible, and as in emergency work especially good assistance is difficult to get, every operator should cultivate the habit of relying upon himself. Hence, I would say, in maintaining asepsis, one of the most important elements is in the method of operation, the skill of the operator, and the manner in which the operation is carried out all the way through.

Immediately after extensive operations there is a reactionary fever. This has been called by von Bergmann aseptic fever. This should not be made the occasion for removing dressings. This fever comes on usually within twelve hours after the operation is performed; the temperature will go to 99½°, perhaps to 101°, and remain at that point for several

days. In the changing of dressings the same principles should be applied as are applied in the operation itself.

In a hasty and imperfect manner I have endeavored to present to you one of the most elementary topics that I could possibly have selected. My reason for doing so is that which I have previously given, namely, an habitual disregard in many instances of aseptic surgical technique to the detriment of the patient, to detraction from the results of surgery, and to the dissatisfaction of all concerned. Now that we have settled all the disputes about asepsis; now that we have a perfect consensus of opinion that the relation of micro-organisms to suppuration and infection is a causative one directly, the time has come for us to have unity of action.

Nothing I have presented this morning is new to the hospital surgeon who is doing operations daily, but to the general practitioner who must devote his time to so many different conditions, yet who is constantly perfecting his methods and increasing the scope of his attainments, I hope a few suggestions will prove of interest and benefit. I would urge that the general practitioner, in addition to dealing with the diagnosis of surgical diseases, should equip himself to do that surgery known as emergency surgery, and which must be done in the homes of patients. He should strive to bring it to a higher degree of aseptic efficiency. The rules of asepsis should be studied by every practitioner who does surgery, so that he can perfect his methods and attain satisfactory results.

PAPERS.

I. INTESTINAL OBSTRUCTION FROM BILIARY CALCULI.

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Intestinal obstruction, one of the most serious calamities that befall the human family, has been observed and written of since the days of Hippocrates, and still it retains its mysteries for the disciple of medicine. Its causes are so numerous, its symptoms so varied and its fatality so great that I feel no necessity for apologizing in presenting this paper, though it considers but one of the very many phases possessed by this malady.

Frequency.—Its occurrence from gall stones, however, is not very common. Brinton found in 500 cases of intestinal obstruction but 4.8 per cent. from gall stones; Leichtenstern found in 1,541 cases of bowel occlusion but 41 (2.6 per cent.) were produced by them. In the Manchester Royal Infirmary from 1883 to 1896 there were 50,000 patients treated, and but one of them had intestinal obstruction from biliary calculi. As it is a condition limited to post-meridian life, though one case is reported as occurring in a man twenty years of age, rarity would not be unexpected.

Varieties.—No doubt, the obstruction is not always from the calculus blocking the lumen of the intestine. A localized peritonitis in the region of the gall bladder may paralyze the bowel in that vicinity, which usually lasts for a certain time and ends by absorption and recovery. Twisting of the small intestine occurs from the violence of biliary colic; a large calculus in the intestinal canal may cause the same condition from contortions of the bowel. Again, obstruction may ensue after the stone has passed, as a result of adhesions from peritonitis from the gall stone attacks, or by healing of a

fistulous opening between the gall bladder and the intestine, with consequent narrowing. And the obstruction may be due to the plugging of the bowel by the calculus itself.

That large calculi nearly always reach the intestine by a process of ulceration between the gall bladder and the bowel, by which an opening of sufficient size is made for the transit of the stone, is unquestionable. This opening is often of great size, and the constancy with which it has been found in autopsies as well as in abdominal sections for intestinal obstruction argues only too strongly for this pathological process. However, Rokitansky and Abercrombie believe the largest stones found in the intestine can pass through the bile duct. Their edges have been found in some cases to be cicatrized and the gall bladder to have the appearance of a mere intestinal cul-de-sac. Sometimes the ulceration is into the stomach and gall stones are vomited. Again, the stone is expelled into the peritoneal cavity, causing severe peritonitis. Ulceration into the colon occasionally occurs, with expulsion of the stone without symptoms. They even pass through the urachus into the bladder, being voided in the marked biliary urine and needing assistance at times through the urethra. They are also expelled through the abdominal wall. The usual location of the cystico-duodenal fistula—the classical location of Roth, is the superior part of the duodenum, usually two inches from the pyloric ring, and therefore above the opening of the bile duct. The fistula has been found sufficiently large to admit four fingers.

Location.—The seat of obstruction seems to be most frequent in the lower part of the ileum, the middle part of it, the jejunum and the ileo-cecal valve. Leichtenstern collected thirty-two cases in which the site of obstruction was seventeen times in the lower part of the ileum, in the jejunum ten times, and five times in the middle of the ileum.

A number of cases have been reported in which the calculus was found wedged in the ileo-cecal valve.

The gradual lessening of the bowel diameter from above down to the valve, together with the relative fixation of the lower part of the ileum by the short mesentery, would seem to explain the comparative frequency near the valve. Occasionally two stones are found obstructing the bowel at differ-

ent places. This has been found at autopsies, both in cases operated and not operated. At other times the obstruction has been relieved by passage of the stone or by operation, and in a few days the trouble is repeated at nearly the same site, but by another stone. Even the rectum has been the seat of obstruction from real gall stones. This may be accounted for by the stone having escaped through the small intestine and its passage along the rectum having been disputed by narrowing of its caliber due to pathological conditions, or by outer layers having been deposited on it while in the colon, or still, by its having sloughed directly from the gall bladder into the colon and its having an unusually large size.

Causes.—Just why gall stones should be formed I will not explain, as that subject is not one to be taken up lightly in connection with other matters in a short paper. That they are formed in the liver, bile ducts, gall bladder, and even the portal vein, is certain, and that they are found occluding the intestinal canal is equally certain. Ofttimes in this tube are formed enteroliths from small gall stones as nuclei, or from fecal matter or minerals taken by the mouth. These are only mentioned to contrast them with true gall stones, such as are to be considered. If the caliber of the intestine progressively increased in size from above downward, or even maintained a uniform diameter, any stone that could be gotten into the upper bowel would be readily passed along and expelled. But, *au contraire*, the ileum has an average width of but 1¼ inches, while the jejunum has one of 1½ inches and the duodenum is still larger. The colon has also a constantly decreasing caliber from the ileo-cecal valve to the rectum, but is considerably larger than the small intestine. Gall stones having diameters of less than one inch, no doubt, do pass through the small intestine without the knowledge of the individual, especially if they have not passed through the ductus communis choledochus. In persons that have arrived at the gall stone age the intestine walls are weakened as a process of senility, and therefore have less propulsive power. Of course, such complications as adhesions of the intestine resulting from former peritonitis greatly handicap the functionating of the canal walls. Small sacculated portions of it will occasionally prevent the stone from being forced

along the canal, cases being recorded in which the stone had become encysted in the wall of the small intestine. We have as yet no positive explanation for obstruction resulting from stones weighing but 109 grains, and in other cases those weighing as much as 493 grains are passed successfully.

It is presumably due to a disproportion in the size of the intestinal canal from constipation or other cause, or perhaps the general construction of the individual may be on a grander scale. Then, too, pathological conditions lessening the caliber or limiting the movements of the intestine may render some patients less competent to expel foreign bodies from this canal. Between the uric acid diathesis and the formation of gall stones some relation is thought to exist. Just why this should produce this condition in women four times as often as in men is not easily explained. Nearly always this condition occurs in people in late life and I found but one case recorded in which the age was under forty years.

I have had the good fortune to see one case—fortunate for the experience and fortunate for the result. The history is as follows:

Mrs. D., aged 44 years, white, multipara, was seen August 9, 1897, in answer to an urgent summons. She had enjoyed excellent health, except habitual constipation, until the evening before, when she ate a hearty supper, including green corn, of which she was very fond. Later in the evening she had danced considerably, and retired about midnight. Later in the night she was attacked with severe colicky abdominal pains, accompanied with almost incessant vomiting, a chill and collapse. The attack was attributed to her having eaten the corn, and her husband, a physician, was obliged to administer morphia repeatedly. I reached her bedside during the afternoon and found a woman weighing probably more than two hundred pounds, and having the largest abdomen, without exception, I had ever seen. It was not distended, but, on the contrary, very pendulous, and its walls exceedingly thick. She was at the time fairly comfortable from the large doses of the morphia, but an examination of the abdomen was unsatisfactory, owing to the extreme tenderness. I ordered calomel, although she had had during the day two loose stools. I did not see her again until

August 12th, when her husband told me her bowels had not moved since my last visit, nothwithstanding he had administered salines and purgative enemata, and her pain and bilious vomiting were marked. Her pulse was one hundred, and temperature ninety-nine degrees. Large enemata in the knee-chest position were ordered. Again that evening I saw her with two consulting surgeons, and laparotomy the following morning was decided on if her condition was not relieved during the night. The large enemata, about one gallon at a time, were continued every four hours, and about midnight she received the last one, as a few minutes later she passed it and an ovoid, cholesterine gall stone, weighing two hundred grains and measuring $1\frac{3}{4}$ inches by $1\frac{1}{4}$ inches in diameter and having circumferences of $3\frac{3}{4}$ and $4\frac{1}{2}$ inches. When I reached the house next morning she was comfortable, the vomiting having ceased immediately after passing the calculus, and, except some remaining soreness in the abdomen, and a degree of exhaustion, she felt none the worse for her experience. The subsequent treatment was a daily saline for a short time, and her recovery appeared complete.

Symptoms.—In these cases there is usually a history of jaundice, biliary colic or other phenomena antedating the attack of obstruction, but the symptoms by no means point directly to the nature of the obstruction. Ofttimes, however, the symptoms will approximately indicate the seat of obstruction. The vomiting is usually earlier if the obstruction is high in the small intestine, and is said to assume the bilious variety. The degree of distension is less, and early in the attack, in favorable cases, a tumor can be felt at the seat of trouble. Later, however, the tenderness is so marked that examination of the abdomen is extremely unreliable. The distension is much greater if the colon be the seat of obstruction, and the vomiting in time becomes more stercoraceous. Movements of the bowel after the beginning of the attack may prove misleading, as the intestine below the obstruction may be emptied without relief to the real trouble. A great deal has been written concerning the location of the distension incident to obstruction in different parts of the canal, but not much of this is of practical value. Fever and high

pulse rate indicate structural changes—such as necrosis of the intestinal wall and localized peritonitis. The urine is decreased in quantity, inasmuch as the vomiting of fluids is persistent and none are taken to counterbalance this loss. There seems to be greater decrease in the kidney action corresponding to the nearness of the obstruction to the upper end of the intestine. No doubt, the shock influences the kidney function also.

The size of the calculi is of interest. Some have been successfully passed through the bowel weighing as much as 493 grains, while fatal obstruction has resulted from a calculus weighing but 109 grains. Their shape is nearly pyriform or ovoid. Skiagraphy has thus far proven unreliable in diagnosis.

Prognosis.—The results from any form of treatment in acute intestinal obstruction are far from encouraging. When due to gall stones the mortality ranges from 44 to 74 per cent. Until it is recognized as a surgical affection almost from the first, and prompt abdominal section done, the results will not improve. No one will say that early abdominal section for this condition would have even 25 per cent. mortality.

Treatment.—Various remedies have been employed for the relief of this condition. Hippocrates recommended rectal injections of air with the blacksmith's bellows, and Coelius Aurelianus vaunted this treatment highly. Even tobacco smoke and tobacco infusion have been forced into the bowel. Purgatives are actually harmful. Morphia is often of great value, and belladonna is highly recommended to relieve pain and spasm of the bowel. Leray, of Etoilles, first employed electricity in 1876, and it has since been vigorously tested in this as in all other ills known, and with the usual reported success. With medical treatment a certain small per cent. recover, but is this sufficient? Can not this frightful death rate be lowered, and will not early surgical interference accomplish this result? In 1672 Barbette proposed laparotomy for acute intestinal obstruction, and, as abdominal surgery is practiced, its use in acute obstruction of the bowel from biliary calculi should give brilliant results. Operation should not be deferred until the patient is *in articulo mortis.*

For a reasonable amount of time the milder remedies should

be employed, the condition of the patient being carefully observed during it. If relief is not afforded in a short time, varying from a few hours to two or three days, then surgical procedure should be employed. This should consist of a careful exploration, through an abdominal incision, for the seat of obstruction. This being found, the condition of the patient and the mobility of the stone in the bowel will guide in the following steps. The plan of Tait, of passing a strong needle obliquely through the wall of the bowel and into the stone to break it up, may first be tried, the puncture opening being closed by a Lembert stitch. This needling failing, as it often will, the stone should, if possible, be pushed higher in the bowel and a longitudinal incision in the wall of the intestine be made, through which the stone should be extracted and the wound closed. Gangrenous bowel, perforations or localized peritonitis, with or without pus, should be treated *secundum artem*. It is always well to look for a second obstruction, as autopsies after laparotomy for this condition have demonstrated a second obstruction—usually higher in the bowel. The deaths following laparotomy for this condition are from shock or sepsis—an argument for early operation. It would not seem improbable that early laparotomy in these cases should have a mortality of less than ten per cent.

DISCUSSION.

DR. J. O. MALSBURY, PERU, IND.—In connection with this paper I desire to report a case which was not operated on. It was that of an old lady, forty-eight years of age, who had been having attacks of hepatic colic for some ten years. She had been treated for various conditions, neuralgia of the stomach more especially, and when she came under my care I thought the symptoms indicated gall stones, and after watching the case through some few attacks, I succeeded in finding stones. I advised operative interference, which was refused for the time being, but the attacks becoming more and more frequent and severe, she finally consented, was taken to a hospital, and after having made the necessary preparations to operate, she rallied again without operation. Following this, probably some few weeks, she had another acute attack, with rupture apparently of the pus sac. Anyhow, she had a general peritonitis following the rupture, and it looked as

though death was certain. She still refused operation, and partially recovered at the end of ten days, in that the peritonitis subsided and the swelling went down. Just about the time she got out of bed she had another attack, attended with general peritonitis. She still refused operative intervention, and is still living. The last attack occurred about a year and a half ago. She has declined very materially in weight. She formerly weighed in the neighborhood of two hundred pounds when she came under my care, and now weighs only a hundred and fifteen pounds. In the last attack she began to have acute pain in the neck and shoulder, so that the neck is drawn in this position [illustrating]. Possibly there was a rupture of pus accumulation in the region of the gall bladder, and the case was evidently one of gall stones to begin with. While the woman is alive, she is miserable to herself and everybody around her. This is certainly an operative case. I did my duty, so far as I could, in insisting upon operation, but as she refused, nothing further could be done.

DR. BOVÉE (closing the discussion).—Permit me to suggest what is to be done in a surgical operation for the relief of this condition. The first thing in opening the abdomen is to search for the seat of obstruction. If we have located the tumor before we have made an exploration, of course we are all the more fortunate, but if the stone is found in the small intestine about the cecum, the condition of the bowel and of the patient will both act very strongly in guiding the surgeon what to do. If the bowel is gangrenous, or shows evidence of puncture near the seat of constriction, then an effort should be made to push the stone higher up in the bowel. If this cannot be done very easily, then an incision is to be made in the bowel. If it can be done, the stone should be pushed up. The best thing is to pass a strong needle through the intestinal wall to the stone with a view to breaking it. If this can not be done, make a longitudinal incision, remove the stone, and suture the intestinal canal.

II. OBSTRUCTIVE GROWTHS OF THE PYLORUS, WITH A REPORT OF A SUCCESSFUL CASE OF PYLORECTOMY.

BY J. E. ALLABEN, M. D.,
ROCKFORD, ILL.

Growths that may cause obstruction of the pyloric orifice of the stomach are:—(1) Carcinoma, simple hypertrophic stenosis, cicatricial growths following simple ulcer of the pyloric region, cicatricial growths from ulcers produced by swallowing corrosive drugs, simple hypertrophy of the coats of the stomach at the pylorus, especially of the fibrous and muscular coats, mucous polypi, and rarely sarcomata, fibromata, myomata, lipomata and cysts.

All of these, excepting carcinoma and cicatricial contractions, are so seldom met with that they need not command attention, only to speak of them in this paper. But cancer of the stomach and of other organs is of such frequent occurrence, and apparently so much on the increase, that it should command our most earnest consideration.

That cancer is one of the most potent factors in causation of death can not be denied. Dr. Senn (2) states that in England and Wales during ten years (1860–70) there were 2,379,622 deaths above the age of twenty, and of this number 81,699 died of carcinoma, a ratio to all other deaths of 1.29.

According to Dr. Joseph B. Bryant, of New York, (3) the death rate from cancer has increased in twenty years (1874–1894) from 1.82 per cent. to 2.17 per cent. of the total mortality. Heberlin (4) gives the percentage of cancer of the stomach from 1877 to 1886 as 4.1 per cent., and states that in Switzerland gastric cancer is on the increase. His statistics show that the death rate from cancer of the stomach for 1,000 inhabitants has increased from 0.61 per cent. in 1877 to 0.99 per cent. in 1886. In England, in 1840, the proportion of deaths from cancer to the total mortality rate was 1 in 129. This rate has increased in forty years (1840–

1880) to 1 in 28. The death rate in that country from cancer is now about four times as great as it was fifty years ago. In twenty years (1870–1890) the Registrar General's report showed an increase of 53 per cent. (5).

The stomach and the uterus are the organs most frequently affected with primary cancer. In 31,482 cases of cancer collected by Welch (6) from various countries, the disease occurred in the stomach in 21.4 per cent. and in the uterus in 29.5 per cent. of the cases, showing that gastric cancer occurred in about one-fifth of all primary cases. Various authors estimate the mortality rate from gastric cancer from 0.6 per cent. to 3.5 per cent. Welch, from New York statistics, estimates that in all cases of death above the age of twenty, 1 in 100 is due to this cause. From an analysis of 1,300 cases of gastric cancer, the same author estimates that in 60.8 per cent. of the cases the disease occupied the pyloric region.

With these facts before us we can see that neoplasms of the pyloric region have assumed a position of great magnitude, and that the methods and results of treatment are of the greatest interest. The forms of cancer that may affect the stomach are according to Orth: (7)

1. The cylindrical cell or adenocarcinoma.
2. The soft glandular or medullary carcinoma.
3. The hard glandular or scirrhous carcinoma.
4. The mucous or colloid carcinoma.

Of this number the cylindrical cell, or adenocarcinoma, is the one most frequently found in the stomach. All treatment directed toward a permanent cure of these growths is, at the present time, limited to surgical procedure. Unfortunately, in cancer of the pylorus the diagnosis is not often made nor surgical means instituted until obstructive symptoms manifest themselves, or, if the diagnosis is made early, the patient will not submit to radical surgical treatment until life is made burdensome by obstructive troubles. The law regarding the prognosis in operative procedure of cancer in general is especially applicable to cancer of the pylorus, viz.: The earlier the operation, the better will be the results. Therefore, to insure more favorable results than have heretofore been obtained, two things are imperative: 1. The perfection to a higher degree of our methods of diagnosis; and,

2, the education of the public to the point of thoroughly understanding the necessity of operating as soon as a diagnosis is made. Patients past the age of forty years should be impressed with the idea that a gastric derangement approaching a chronic condition should receive thorough study at the hands of the physician, to determine, if possible, the presence of malignant disease. If in the next ten years gastric disorders should receive as much study with a view of determining the possibility of malignancy as the subject of appendicitis has received in the last ten years, radical operations upon the stomach would show a vast improvement in the percentage of recoveries.

The various operations designed to relieve obstruction of the pylorus are: (8)

1. Gastro-enterostomy, which is only a palliative measure.
2. Digital divulsion of the pylorus—Loreta's operation.
3. Pyloroplasty.
4. Pylorectomy or resection of the pylorus, of which there are three types:

(*a*) Typical, total or circular pylorectomy.

(*b*) Atypical pylorectomy, which consists of a combination of pylorectomy with gastro-enterostomy.

(*c*) Partial pylorectomy.

*Gastro-enterostomy.**—This operation was first devised by Wölfler, and consists in establishing a communication between the stomach and a portion of the intestine below the duodenum. It is merely a palliative measure, and according to some authorities its rate of mortality is nearly as high as is that for pylorectomy, and the remote results are less favorable than in pylorectomy.

Digital divulsion of the pylorus.—This procedure was first practiced by Loreta, and consists in opening the stomach and gradually forcing one or two fingers through the contracted orifice, or the dilation may be accomplished with instruments. The application of the operation is limited, and Häberkant, who collected 31 cases of Loreta's operation, reports a mortality of 38.7 per cent.

Pyloroplasty.—This operation originated with Von

*NOTE.—For the description of the various operations upon the stomach, and for statistics relating thereto, we are indebted to a number of authors, but especially to the work of Dr. John C. Hemmeter on "Diseases of the Stomach."

Heinecke, in March, 1886. Mikulicz, without knowledge of Von Heinecke's work, used the method in February, 1887. Since this date various surgeons have performed the operation, usually with satisfactory results. Dr. W. J. Mayo, of Rochester, Minn., reported five cases in 1897 (9) upon whom he had successfully performed pyloroplasty. The operation is especially applicable to non-malignant cicatricial stenosis. It is performed by making an incision through the cicatricial tissue on a line parallel with a line passing through the pyloric lumen. The wound is then pulled apart, which procedure widens the calibre of the pylorus, and the wound is then sutured together transversely.

Pylorectomy.—The first experimental work for pylorectomy was done by Merram upon dogs, in 1810. This work was farther advanced by Gussenbauer, Von Winiwarter, Kaiser and Czerny. Häberkant mentions a total extirpation of the stomach by Dr. Connor, of Cincinnati, as a surgical curiosity, the patient dying before the operation was completed. Torelli, in 1878, did the first gastric resection, removing a portion of the stomach sixteen cm. long, in case of a stab wound, with prolapse of the organ. Billroth, in the same year, healed a gastric fistula by exposing the stomach and suturing it.

The first pylorectomy was done by Péan, in 1879, and one was performed by Rydygier, in 1880, but both patients died. In January, 1881, Billroth performed the first successful pylorectomy.

Total pylorectomy is one of the most formidable operations, and in the earlier cases the mortality rate was extremely high. According to Dr. Senn (10), in 66 cases death resulted in 50. According to Dr. Tillmann (11), the mortality of the earlier operations ranged from 57.4 per cent. to 61.4 per cent.

In spite of these facts we believe that in the near future our methods of diagnosis and the technique of operating will be so advanced that pylorectomy will be performed with no greater mortality rate than follows any operation in the abdominal cavity for a similar disease.

If we compare the early mortality statistics with those of later years, we can already see the result of improved methods. While the mortality from 1881 to 1885 was 61.4 per cent.,

from 1886 to 1892 it was reduced to 34.3 per cent. (12). Häberkant (13) collected the statistics of 205 cases and grouped them into two periods. The first (1881 to 1888) showed a mortality of 62.8 per cent.; the second (1888 to 1895) a mortality of 45.1 per cent. He estimates that for carcinoma this is a reduction from 65.4 per cent. to 42.8 per cent., and for benign pyloric stenosis a reduction from 42.8 to 27.7 per cent. In 1882, of 13 cases of resection for carcinoma, all died; in 1893, of eight cases all lived.

In judging of the value of this operation, we must take into consideration; first, the immediate, and second, the remote, results. As to immediate results, Häberkant (14) tabulates 379 cases of pylorectomy from the records of different operators; 191 recovered and 188 died. Of the total number operated upon, 175 were for carcinoma, of which 130 recovered and 45 died. As to remote results, the same author's tables show that the cases recovering from the immediate effects of the operation died afterward from 1½ months to 8 years. One of Billroth's cases lived 5¼ years; one of Wölfler's cases 5 years; one of Kocher's 5⅓ years. Rydygier reports a case living in good health at the end of 6 years, during which time she had given birth to two children. One case of Ratimmow's was living at the end of eight years.

It is true that at first thought these are not very encouraging statistics; yet when we take into careful consideration all the facts and circumstances relating to cases of this character, the operation of pylorectomy does not suffer as much by comparison with other operations for carcinoma as would at first appear.

The remote results of operations for carcinoma of the breast are, all things considered, but little better than those for pylorectomy. According to Tillmann (15), the average duration of life, after the beginning of the disease, for those operated upon for carcinoma of the breast, is 27.4 months, and for those not operated upon 20.5 months, a difference of only seven months in favor of the operation. Sibley, who is quoted by Senn, says that in 78 cases not operated on and 63 operated on for carcinoma of the breast, the latter lived on an average one year and nine months longer than the former.

The number of permanent cures for mammary cancer compared to the number of operations for this malady is in reality but few; yet we do not hesitate to recommend it, for it is the only hope of prolonging life. In later years the percentage of supposed cures for cancer of the breast—the patients having no return of the disease after three years—is estimated by various authors from 4.7 per cent. to 22.5 per cent. This improvement in the percentage of cures is due to the improved methods of operating—the thorough removal of lymphatic glands, fat and cellular tissues in all cases from the axillary region. What, then, may we not expect in the future, and, in fact, are already beginning to realize from improved methods of diagnosis and more perfect technique in the operation of pylorectomy? We have already observed that the mortality has been reduced in cancer cases from 65.4 in 1879 to 42.8 in 1887. When we consider that it is only since the period of aseptic and antiseptic surgery that the abdominal cavity could be safely invaded; that the stomach is a vital organ in a comparatively inaccessible region, and that the operation is usually postponed until the patient is exhausted from the effects of obstruction, the wonder is not that pylorectomy at the present time is a very fatal operation, but that it can be attended with success at all.

Diagnosis.—Time forbids an extended consideration of this subject. According to Jakob (16) the symptoms indicative of carcinoma of the stomach are: Occurring in persons between 40 and 60 years of age; insidious in outset; appetite is lost and strength fails; gastric derangement with pain, eructation and heartburn. Later vomiting of food and stagnation of food. Eventually hemorrhage, with vomiting of matter having the appearance of coffee grounds; increased cachexia, absence of free hydrochloric acid, with the presence of considerable lactic acid in the gastric juice. Frequently a tumor may be felt in the region of the stomach, which is slightly movable with respiration if not adherent to the liver. The duration of the disease may be from six months to a year and a half.

It is a well known fact that cancer cells do not multiply by simple division (fission), but by indirect division (karyokinesis). Therefore it is suggested by Hemmeter that

attempts be made to find in the stomach contents cells undergoing this indirect division. He says: "Whenever we find pieces of mucosa in which the glandular ducts are elongated and dilated, and the cells present numerous karyokinetic figures and forms of mytosis, and where asymmetrical and hypochromatic forms are found, the possibility of the existence of carcinoma must suggest itself even when typical carcinoma cells are absent." He suggests feeding the patient per rectum for forty-eight hours; washing out the stomach with normal saline solution, using a rubber stomach tube with a sharp, chisel-shaped edge around the lower opening, which is more likely to dislodge surface particles, then allowing the detritus in the fluid to settle in a conical glass or bring it down with a centrifuge for careful microscopical investigation.

The presence in the gastric juice of a large number of the long, ball-bat shaped, Oppler-Boas bacilli, which are supposed to be the cause of lactic acid formation and the continual absence of free hydrochloric acid, while not pathognomonic of cancer, have considerable weight in determining the diagnosis. If a tissue shred is obtained with characteristic carcinoma cells the diagnosis is positive.

Report of a case of pylorectomy.—In speaking of my case as a successful pylorectomy, I refer to the immediate and not to the remote results; for, although the case recovered rapidly from the operation, death occurred two months later in the peculiar manner hereafter related:

On the 10th of June, 1897, was consulted by Mrs. H. W. B——, giving the following history: Age 28 years, married and mother of two children, the oldest three and the youngest about one year old, being born on the 27th of July, 1896. About two months before the birth of this child the patient began to have sharp pain in the region of right costal arch, radiating up the side to the right shoulder, and lasting about half an hour, or until relieved by medicine. These attacks occurred every two or three weeks up to the date of the birth of her child; after this the attacks still occurred, but were less severe, and the pain became localized in the right hypochondriac region. Three or four weeks after the birth of the child the patient discovered a tumor in the right hypo-

chondriac region, which she described as being movable and sometimes difficult to find. Some weeks previous to this time she commenced to have stomach trouble after eating; this trouble gradually grew worse, and for six months nearly every meal was vomited from one-half to three hours after eating. She had lost much flesh during the last ten months. Her normal weight was 125 pounds, present weight 89 pounds, a loss of 36 pounds.

The general appearance of the patient at this time would suggest lack of nutrition, but not cachexia. Physical examination revealed a tumor lying under the umbilicus, of the size, form and consistency of a kidney, the concave surface being turned downward and to the left. The kidney could be palpated on the left side, but not on the right. The tumor could be moved two or three inches toward the left, but much less, though slightly, to the right. The pelvic organs were normal.

Though the symptoms were those of pyloric obstruction, the fact that the patient was young for malignant trouble, was not cachetic, and that the right kidney could not be palpated, led me to question whether the kidney of the right side could have been displaced during pregnancy and afterward become fixed by adhesive inflammation, the origin of which might be in the bile tracts—the vomiting being caused through reflexes. Operation was declined.

Six weeks from this time the patient returned, more emaciated, tumor more fixed, and willing to submit to an operation, if it seemed advisable. She entered the hospital August 30th. On the 1st of September, assisted by Drs. P. L. Markley, Frank H. Edwards and T. H. Culhane, I made an exploratory laparotomy, following it with a total extirpation of the pyloric end of the stomach, in the following manner:

An abdominal incision was made four inches in length along the outer border of the right rectus muscle, the center of the incision being opposite the umbilicus, at which point the tumor was located. The tumor and a portion of the stomach were drawn out through the incision after some peritoneal adhesions about the under surface of the growth and about the duodenum were released with the fingers.

FIG. I. Photograph of a portion of transverse colon, removed post-mortem. *P*. Perforation in the intestine where Murphy button was found. *S*-1. Stricture near hepatic flexure. *S*-2. Stricture near splenic flexure.

FIG. II. Photograph of resected pylorus. The view represents the point where the tumor was severed from the stomach.

FIG. III. Photograph of resected pylorus. *P*. Pylorus completely occluded by carcinomatous infiltration.

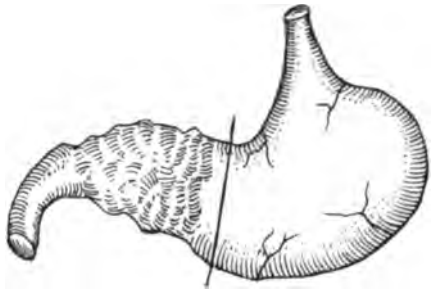

FIG. IV. Diagrammatic. The dark line represents approximately the point of amputation.

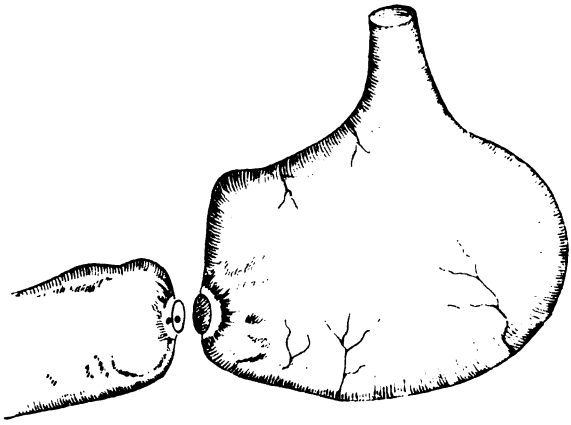

FIG. V. Diagrammatic. Murphy button in position ready for approximation.

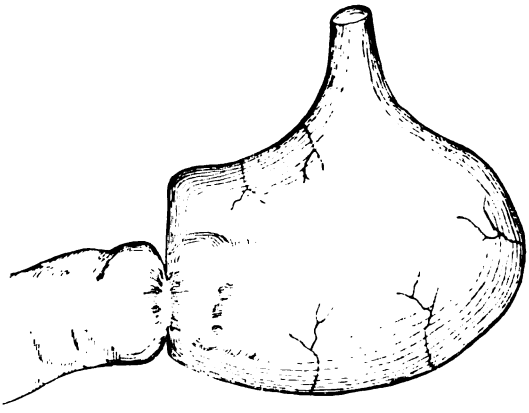

FIG. VI. Diagrammatic. Showing duodenum approximated to the lower angle of the stomach.

There were no adhesions to the liver or pancreas. The omentum along the greater curvature of the stomach was ligated in sections with double rows of strong catgut to a point a little beyond the neoplasm. The omentum was then cut away. The lesser omentum was treated in the same manner. The raw surfaces of the greater omentum were brought together and buried by a continuous Lembert suture of catgut. The duodenum, which was not involved by the tumor, was compressed with Murphy's intestinal clamp and cut off near the pylorus. During the manipulations that followed the clamp was displaced and considerable bile flowed into the peritoneal cavity. The duodenum was then simply plugged with sterilized gauze. A circular incision was made with a scalpel around the stomach a little beyond the limits of the tumor, passing through the serous and muscular coats. The amputation through the mucous coat was completed with the scissors while the stomach was held by an assistant.

Although the patient had taken only liquid food for several days, when the amputation was made a number of chunks of meat and potatoes, too large to enter a stomach tube, and some liquid, poured out of the stomach and were received in a receptacle. The mucous coat was brought together with a continuous Lembert suture of strong silk (No. 11 or 12) to within one inch of the lower angle.

The serous and muscular coats were approximated with a continuous Lembert suture of formalized catgut. Over this was placed a continuous Lembert suture of fine catgut embracing only the serous coat.

A purse-string suture was inserted around the opening left in the lower angle of the stomach, where the duodenum was to be attached, and the male half of a Murphy button inserted and secured in the usual way. Owing to a compensatory hypertrophy of the muscular coats of the stomach, the tissues were very thick, so that the serous and muscular coats only were secured by the purse-string suture for the bite of the button. The other half of the button was placed in the duodenum, the purse-string suture tied, and the approximation made by pushing the button together. The abdominal wound was closed with silkwormgut sutures, which included the peritoneum as well as the other tissues of the abdominal wall.

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The tumor removed measured 5½ inches along the line of the greater curvature, and a little more than four inches on a line passing through the lumen of the pylorus; in thickness it measured two inches. According to Gray, the stomach, when moderately distended, measures twelve inches in its longest diameter. Therefore fully one-third of the stomach was removed by the operation.

The patient recovered rapidly from the operation. The highest temperature was on the evening of the day of operation, being 100.8° F. At noon on the following day the temperature was normal, and remained practically so during her convalescence.

The wound healed by first intention, and the stitches were removed on the tenth day. On the eleventh day she sat up one hour, and on the fourteenth day she walked out of the hospital, and went by carriage to a friend's home, a distance of half a mile. The third week she returned by rail to her home fifty miles away.

After-treatment.—When the operation was completed, the pulse was 140 and weak. Before leaving the table there was injected one pint of hot normal saline solution under each breast, and one quart of the same solution was injected into the colon through a long rectal tube, the hips being elevated.

Ordered strych. sulph. 1-20 gr., hypodermatically, every three or four hours; brandy, 1 dr., hypodermatically, every half hour to every two hours, as indicated by pulse; one pint normal saline, by enema, as required for thirst.

No opiates were required for pain, and only once was an anodyne given (chloral hydrate, gr. xv., per rectum) to produce sleep. Nutrition was maintained for four days by rectal feeding; liquid food was given on the fourth day and light solid food on the tenth day.

For a month and a half the patient continued to improve rapidly, and engaged in her usual occupations. Faithful watch had been kept for the Murphy button, but it had not been procured.

On the 15th of October, one and one-half months after the operation, the husband wrote that the patient had gained six and one-half pounds, but was having griping pains in the bowels, and during these pains a lump could sometimes be

felt in the abdomen. On the night of the 19th, after returning from a party, she ate heartily of raw oysters, and soon after was taken with an intense pain in the abdomen, followed by all the symptoms of perforating peritonitis.

I was out of town, and Drs. Windmueller and Pryne, of Woodstock, attended the case. I saw her on the 22nd; temperature 103° F., pulse 130, abdomen greatly distended, too weak for operation. I expected the case to prove fatal in 24 hours. At the expiration of this time, however, her attending physicians reported some improvement in her condition, and I opened the abdomen in the median line below the umbilicus, letting out several quarts of fluid, the color and consistency of chyme, with some pus. Drainage was maintained with gauze. On the 26th, two days after, Dr. Windmueller reported that the patient seemed better. "Pulse 120 full, fairly strong, temperature 98.6° F., tongue clean, complains of having no appetite." Two days later she died from exhaustion.

Post-mortem.—Considerable pus and fluid in abdomen; intestines matted together and covered with lymph exudate; union of stomach coats and of the duodenum to the stomach was perfect. A large perforation was found in the transverse colon, a few inches beyond the hepatic flexure. At this point the Murphy button was found, held by a tight stricture of the intestine. A second stricture was revealed near the splenic flexure, through which could be passed an object about the size of a lead pencil.

Regarding the character of the pyloric tumor and the strictures of the colon, I submit the following:

"KLEBS' PATHOLOGICAL LABORATORY,
"CHICAGO, ILL., Sept. 27, 1899.

"In reply to your favor will say that (1) the growth and stricture are carcinomatous; (2) the histological picture shows an abundance of stroma with but few epithelial cells distributed in the same. They must have been of slow growth.

"[Signed] F. R. ZEIT,
"*Assistant Pathologist.*"

In conclusion I would observe that:

1. Cancer is one of the most potent factors in the causation of death, with a tendency to constant increase in frequency of occurrence.

2. Gastric cancer occurs in about one-fifth of all primary cases.

3. In gastric cancer the pyloric region is affected in 60 per cent. of the cases.

4. The treatment of gastric cancer directed toward a permanent cure is, in the present state of our knowledge, limited wholly to surgical methods.

5. As early total extirpation of malignant growths with the hope of permanent cure is the goal toward which we are constantly striving, and as these growths in gastric cancer occur at the pyloric region in 60 per cent. of the cases, it would seem to follow as a natural conclusion that pylorectomy would be the treatment most frequently prescribed for the cure of this malady.

6. Inasmuch as early diagnosis is the greatest requisite for directing proper radical treatment, the internalist and the surgeon should turn their best efforts in this direction.

7. If the operation of pylorectomy were performed before obstructive symptoms manifest themselves and before the occurrence of metastasis, the immediate results would be as favorable as those of many other abdominal operations, and the remote results as good as in extirpation of the breast for carcinoma.

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DISCUSSION.

DR. ALLABEN (replying to question).—Regarding the gentleman's question about the X-ray, I would say that this was a case where its application was indicated, and by using it the Murphy button could undoubtedly have been located. In my report of the case you will remember that I spoke of the patient suffering from griping pains in the bowels at times, for a week — due of course to intestinal peristalsis excited by the button lodging at the stricture. But I did not see her until perforation had occurred. In another case of this kind I think I would not use the button. We must expect in advanced cases of carcinoma of the stomach secondary growths, and the question arises whether we should attempt resection of the pylorus or content ourselves by giving the patient the temporary relief afforded by gastro-enterostomy.

During the operation I observed the collapsed condition of the transverse colon, but, as no food had passed the pylorus for some months, this condition of the colon did not arouse a suspicion of stricture.

The point I wish to emphasize is, the importance and necessity of diagnosis and operation in these cases before obstructive symptoms occur. Operations in the abdominal cavity to-day are done so safely, it seems to me that this trouble, which is becoming more and more the cause of death in the human family, should receive a greater amount of attention. With improved methods of diagnosis and perfection in the technique of operating, many lives might be saved which now are sacrificed.

III. THE MODERN SMALL-BORE PROJECTILE.

BY AUGUST SCHACHNER, M. D.,
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With the introduction of the Lebel rifle by France in 1886 a new epoch was created in modern warfare and military surgery. The French example was soon imitated by other powers, until to-day every advanced nation has practically the same character of rifle. Although thirteen years have elapsed since that date, and wars of more or less consequence

have occurred, we are still short of sufficient data to enable us to reach complete and uniform conclusions as to the influence and effect which this new rifle is capable of creating.

With the improvement of the rifle and the corresponding improvement of the projectile and explosive we are able to drive a missile with more energy, more accuracy and greater velocity. Furthermore, the combatant enters the conflict with a greater number of cartridges, which can be fired with greater accuracy and rapidity than formerly. Under such circumstances engagements were expected to occur at longer ranges, dressing stations and hospitals to be removed to greater distances or to protected positions. Because of this there will be a greater number of wounded and greater difficulties encountered, not only in the removal of a larger number of wounded but removal would be under more difficult conditions.

Much has been promised for and much is expected of the small-bore projectile, but as to how thoroughly it will fulfill the expectations and demands yet remains to be determined.

The experimental efforts have been both numerous and various, but their conclusions lack the desired uniformity, at least as regards certain specific features. This lack of uniformity in the experiments of Beck, Bruns, Reger, Delorme, Chavesse, Chauvel, and others, has prompted the Prussian War Office to undertake an elaborate series of experiments with the view of reaching accurate conclusions as regards the new projectile. Practical results justify one in doubting as to whether the new projectile is a step forward or backward when broadly considered from a humane as well as a fighting standpoint. Here the attending circumstances must be considered. It largely depends upon whether the contending forces represent an advanced, civilized nation or not. In the latter instance the new projectile has fallen short of the expectations. Certainly no stronger proof of this insufficiency could be desired than that furnished by the English government. The creation of the "dum-dum" bullet is a positive confession that the new projectile does not fulfill the practical demands.

In the Chitral expedition the English, armed with the Lee-Metford rifles, were clearly unable to stop the rush that

was made upon them. Soldiers have been known to continue fighting after a half dozen Lee-Metford bullets had passed through them. This experience resulted in the invention by Capt. Bertie Clay, P. A., of a soft-nose bullet, known as the "dum-dum."

The experience of the Italians in Abyssinia, armed with the Carcano rifles, was no different; not only were they easily defeated but the Abyssinians indulged in humorous criticisms, such as "*Les fusées d'enfants*" and "*Qui ne tuent pas*," regarding the new weapon. A similar result attended the use of the Murata rifle by the Japanese during the Chinese-Japanese war. "The Chinese wounded by two or more small-bore bullets had no difficulty in getting away, while the real execution was done by the heavier bullets which were still being used by the bulk of the Japanese troops." General Howe (*Annals of Surgery*, page 48, Vol. xxv), who commanded the leading column in the Chitral campaign, is quoted by the *Washington Post* as saying: "Often prisoners were brought in with two or three bullet holes through them that seemed to cause the wounded men but little inconvenience, for they had been marched six or seven miles before they reached our bivouac. These prisoners accounted for the extraordinary absence of the dead enemy on the field by saying that unless a man was shot in the head or bowels he did not die, and nothing but a wound in the joints of the lower extremities disabled him. I am clearly of the opinion that for fighting savages, the old forty-five (45) calibre arm should be used. The Chitrals had a forty-five (45) calibre rifle, and they disabled or killed a man whenever they hit."

From this it is evident that the practical results have not been sufficient to enable us as yet to reach uniform conclusions as to the precise merits and demerits of the new projectile. That it has advantages, it is useless to repeat; that there are certain shortcomings, the practical results have already demonstrated. At present the interesting feature of the new projectile is to determine the conditions under which the greatest advantages are to be gained—the circumstances under which it behaves as a humane invention and when it does just the reverse. In a contribution to the *Revista de Ciencias Médicas*, of Havana (London *Lancet*, June 6, 1896),

Dr. Enrique Pedrassa, a Spanish military surgeon, remarks that the benign results he had expected to see do occur, but only when the enemy is 150 yards or more distant. When a person is shot at from ten to seventy yards the destruction of the tissues is very great, and it is this that has given rise to the suspicion that explosive bullets were being used, especially as the orifices of outlet and entrance are so small that they can hardly be seen. If the fighting should never occur at less than 200 yards, the Mauser would be the most humane weapon. To appreciate the small-bore projectile it is well to consider some of the conditions governing the behavior of projectiles in general.

Whenever any projectile strikes a body we are at once confronted by two opposing forces, the one in the main an onward force inherent in the projectile and the other a resistant force inherent in the object. Each of these forces is capable of wide variation under modifying conditions. On the side of the projectile the effect is dependent upon the character of the weapon, the explosive and the projectile itself.

The rifling of the bore of the modern weapon has given to the projectile a rotatory movement in addition to its penetrative one. This rotatory motion imparts accuracy to its flight and an independent lateral action on meeting an object. This has been thoroughly brought out by the experiments of the German War Office and others, that even after the penetrative action of the projectile ceases the rotatory action may continue.

The substitution of practically smokeless for the ordinary powder has increased the missile's energy and velocity, not to speak of the other advantages which the smokeless explosive has over the common gunpowder.

Hand in hand with the rifling and other improvements in the weapon and the improvement in the propulsive agent came the change in the projectile. For a soft, wide and heavy projectile we substituted one hard (non-deforming), narrow (diminished frontage) and lighter, the latter enabling the combatant to carry a greater number. The change from a soft to a hard projectile overcame its tendency toward alteration in its form, and upon the preservation of its form

largely depended its degree of penetration as well as the character of the wound it was capable of creating. The humane nature, whenever the wound partakes of this character, is due more to the non-deforming character than any other element. For this reason the English introduced the soft-nose, or "dum-dum," bullets in their colonial wars. These projectiles produced gruesome wounds, and exposed England to the criticism from other powers that the use of this bullet was contrary to the convention made with European powers in 1868. Lately the "dum-dum" bullet has been replaced by another projectile, known as the hollow-tip bullet. The following is extracted from an abstract of an article by Prof. Bruns (*Beiträge zur Klinischen Chirurgie*, B. xxiii, Heft 1, in *Annals of Surgery*, Vol. xxix, page 651):

"This bullet is the same diameter, the same length, 1 1-5 inch, and the same weight, 215 grs., as the Lee-Metford bullet. The case is of nickel, the base only being filled with lead. The conical end is left empty, and when it strikes the enemy bursts open backwards and lodges in the body, penetration being lessened and shock increased. The new bullet is spoken of as the man-killing instead of the man-penetrating bullet. It is propelled with cordite, and has as much energy as the Martini-Henry bullet, of 410 grs., had with the best gunpowder, while it is half the weight. It is more easily deformed than the ordinary jacketed projectile but not as easily deformed as the 'dum-dum.' At short range all injuries are more severe than by the jacketed. Wounds of hollow viscera containing fluid are of tremendous severity, as the missile explodes with great force. In penetrating it compares favorably with the ordinary so long as no alteration in its shape is produced; the greater the resistance of the target the more unfavorable the comparison."

The following examples are instructive:

"Distance 25 metres, dry deal block, 'full mantle,' no change, 100-110 centimetres penetration; hollow tip, slightly altered, 84 centimetres penetration; lead tip, markedly altered, 20 centimetres penetration. Same distance, dry beech wood, 'full mantle,' no change, 54 centimetres penetration; hollow tip, markedly altered, 14 centimetres penetration, lead tip, markedly altered, 12 centimetres penetration."

Reduction in calibre means a reduction in the resistance offered, not alone by the object but also by the atmosphere. The accuracy of the projectile's flight depends largely upon its weight, for the lighter the missile the more rapid must be its rotation to secure accuracy, since the lighter the missile the easier will its rotation become irregular.

According to Köhler, a 5-mm. projectile must rotate about 7,000 times per second to secure its accuracy. We may sum up that energy, velocity, weight, frontage and the likelihood of deformation are the factors on the side of the projectile which determine its effect upon striking an object.

In speaking of the ballistic qualities of the new projectile, different writers have compared its action with that of a spinning top. When the top begins to spin it is a rotatory motion, accompanied by more or less lateral wabble; soon the lateral wabble disappears and we have a pure rotatory motion. Toward the close it again assumes the lateral wabble, which increases with the decrease of the rotatory motion until the spinning comes to a close.

The division of the new projectile's flight into three zones has been suggested: The first, or explosive zone, owing to the explosive appearance which wounds created in this zone commonly present; the second, or penetrative zone, owing to a purely penetrative nature which represents the behavior in this portion of the missile's flight, and the third, or concutting zone. By explosive effect we mean the destruction created outside of the projectile's passage.

In the first zone the projectile's flight represents a high degree of energy, velocity, rotation and lateral sway.

In the second zone a gradually diminishing energy, velocity and rotation, with very slight lateral sway, which makes its effect practically a purely penetrative one.

In the last the energy, velocity and rotation are diminished, the lateral sway again occurring and increasing with the decreasing penetrative action.

The German War Office does not favor such a classification, owing to the difficulty of determining a division in the projectile's flight.

The elements inherent in the object, or target, which determine the effect of the projectile are various, prominent

among which are two forces—elasticity and cohesion. To these may be added the physical properties peculiar to the body, such as specific gravity, homogeneity, etc.

Before a body will break or tear, it will bend and stretch in proportion to the amount of elasticity it possesses. The assertion of the elastic force is largely dependent upon the velocity of the projectile, for the greater the velocity the more the object behaves as an inelastic body, and the less favorable is the condition for the exhibition of the elastic force. The influence of cohesion applies as strongly to the projectile as it does to the object, for if the cohesive force in the target is greater than that of the projectile, there occurs a destruction of the projectile rather than that of the target.

Köhler divides the resistance which a body offers into active and passive. The active is that which is appreciated in a gross way, and the passive that which is considered in a molecular sense. Both, however, are molecular in their character, for to overcome the resistance is to overcome the molecular inertia or destroy its cohesive force. This has been shown in a classical way by Kocher by firing into a tin box filled with marbles and observing the impressions that the exterior of the box presented as the result of the internal impact. (Köhler, "Die Modernen Kriegswaffen," page 152.)

Specific gravity is another factor modifying the momentum of the projectile as much as it modifies the resistance of the target. The heavier the projectile the greater the momentum, the heavier the target the greater the resistance, other things being equal.

Homogeneity modifies the effect in that the more homogeneous the body is the more perfectly is force transmitted. Here again experimenters have made the can serve a useful purpose. When filled with water and fired into a perfect explosive action is obtained. The experiments of Reger, "Neue Beobachtungen über Gewehrschusswunden," *Deutsche Militär-Ärztliche Zeitschrift*, 1887, Heft 4, Taf. LIV, have demonstrated the influence which distance plays upon the development of explosive action. Cans filled with fluid and fired upon at a short range showed perfect explosive action, whereas when fired upon at a long range there was simply an opening of entrance and exit. Furthermore, he recognized

the rôle which the deformation of the missile played in the production of the wound, and suggested in an address, "Die Anforderungen der Humanität," Lülie, "Vorlesungen über Kriegschirurgie," the substitution of hard for soft missiles—a suggestion which later met with adoption, but for purely technical reasons.

Since the amount of moisture which a tissue possesses determines the explosive effect of a missile as much as its distance, and owing to the difficulty of determining the limit of the respective zones, the German War Office proposed in lieu of the division into zones a classification into "*Näh-schüsse*," short range, and "*Fernschüsse*," or long range.

The explanations of the explosive effect that commonly attends wounds of viscera filled with or rich in fluid, lack a noticeable degree of unanimity. According to Busch, it is due to hydraulic pressure, and is encountered in wounds of the head and shafts of long bones. Von Beck, Vogel, and the German Commission, consider it to be due to a hydrodynamic rather than a hydraulic force.

Sir William MacCormac (London *Lancet*, August 3, 1895) believes "that the explosive effect is due to the rapid arrest of the flight of the bullet on piercing fluid matter, and its motion being transferred to the parts immediately surrounding it, and these again transmitting it to parts further removed, somewhat as wave circles are produced by a stone dropped into smooth water." He objects to "the hydraulic idea, because the pressure is not equally exerted in all directions, but chiefly in the direction of the flight of the projectile, and it occurs in almost an equal degree in both closed or entirely open vessels filled with fluid or jelly." According to Köhler, page 174, it is due more to the projectile acting as a wedge, which, moving with a high degree of velocity, produces an impression that is suddenly and perfectly transmitted in every direction throughout the entire mass. The same author points out that the velocity makes it impossible for the water to separate with the necessary rapidity, and being incompressible and homogeneous, it not only behaves as a solid body but in the most sudden and perfect manner transmits force in all directions. In considering this, two factors must be borne in mind, first, the degree of increase in

volume and the rapidity of this increase. Water has, indeed, an extraordinary influence on the projectile's flight, as Sir William MacCormac has pointed out that a projectile capable of traveling 4,000 yards in air will be arrested after traveling three or four yards in water. Summing up, we may repeat the epigrammatic expression of Köhler: "Diminished velocity and increased mass, increased velocity and diminished mass destroy in a like manner the opposing object. Movement and mass on the one hand and time and space on the other are the elementary factors in the behavior of the projectile and target."

Coming more directly to the effect of the projectile on the human body, we again refer to the division of its flight into zones, this at least being a convenient way of analyzing the character of wounds it is capable of creating.

The first zone comprises the first 500 m. of the projectile's flight, and has been termed by Habert the explosive zone, and by Bruns the zone of greatest energy. The second zone comprises a distance from 500 to 1,200 m., and the third zone a distance of from 1,000 or 1,200 to 2,000 m. (*loc. cit.*, Dr. Eschweiler, "Die Schussverletzungen durch das kleinkalibrige Gewehr").

Wounds of bones that have been inflicted in the first zone are characterized by extensive crushing and splitting, while in the second zone we have a clearly perforated wound, such as might be made by a punch, and that has by many been referred to as typical of the new projectile. In the third zone we have an extensive injury to the bone different from that created in the second zone but resembling in some degree that created in the first zone.

The prognosis, where the bone is splintered, depends largely upon the degree of comminution. Where the fragments are large, with the periosteum intact, the fragments may yet receive sufficient nutrition to preserve their integrity and determine a successful reunion. Where there is great comminution with a separation from the periosteum, they are not only lost but play the harmful rôle of foreign bodies. The degree of splintering and comminution is not alone dependent upon the distance, but also upon the portion of the bone that is involved. A wound involving the shaft is attended with

a fracture into larger fragments and less real comminution than that which attends a wound of the extremities of the bone. These large fragments with their intact periosteum give to these wounds a favorable nature.

Reviewing the experiments of Bruns, Sir William MacCormac (*loc. cit.*, London *Lancet*, August 3, 1895) notes that Bruns found intense "explosive effects up to 400 yards." These attained their maximum in the skull and upon semi-fluid organs like the liver, spleen, a full stomach or intestine. In the elastic lung tissue, however, or upon empty viscera no effects of this kind followed. When the bone was implicated, the track as far as the bone was usually no larger than the ball, but the tissues beyond were always extensively damaged and the exit wound was very large. At a distance of 400 to 800 yards explosive effects were witnessed only in the skull. Soft parts were traversed by a narrow channel, no larger than the bullet itself, with but little damage to the surrounding tissue. At the range of 800 to 1,200 yards explosive effects were only occasionally produced in the skull, and in a much diminished degree. The 900 experiments made by the German War Office do not harmonize with Bruns' classification of injuries into groups according to range. As the range increases there is a gradual diminution in the velocity and energy of the projectile and a corresponding diminution was observed in the extent of the injury. The bullet in nearly every case was found to go straight through the part struck, and the old-fashioned contour shot was never met with. The human body is traversed with ease at 2,000 yards, and the skull, thorax and abdomen will suffer alike. At less than half this distance the old bullet has lost most of its momentum and becomes flattened out or impacted when it strikes a bone without penetrating deeply. In wounds of the abdomen the liver showed the largest amount of damage, and in some cases of suicide large portions of it were reduced to pulp. "Up to 1,200 yards the entrance wound was usually large and stellate and the exit track funnel-shaped, with lateral rents extending from it."

Gunshot fractures of the long bones vary according to which bone or part of the bone is struck. The effect upon the spongy extremities and upon the compact tissue is very

different. From 100 to 200 yards the shaft of the femur is broken up into small pieces for an extent of from three to five inches, and the humerus from two to six inches. At the entrance wound in the bone, the fragments remain in part attached to the soft parts, but at the wound of exit they are completely filled with bone débris and detached fragments of bone, the muscles and tendons are torn and the exit wound in the soft parts is large and ragged.

In the spongy bones and spongy extremities of the long bones, the crushing and fissuring at short range are also great but the fissures are often concealed by untorn periosteum, and there is less damage to the soft parts at the wound of exit. At the range of 600 yards there are occasionally key-hole shots with radiating fissures in the spongy tissue, and at 800 yards the key-hole channels become frequent, but even up to 1,600 yards the compact tissue is extensively fractured. At 1,200 yards the fragments of bone, as a rule, are no longer driven into the soft parts beyond; but this happens occasionally even up to 2,000 yards.

"The conclusion to be drawn from the German experiments is that the damage to the shaft of a long bone is very extensive for all ranges up to 2,000 yards, the main difference being that at short ranges of 200 to 300 yards, for example, the fragments are more numerous, smaller and more stripped of periosteum, while the converse obtains at longer ranges. Cases where a large artery is wounded generally die before help arrives, and it is interesting to know that in the late war in China, the Japanese surgeons had such perfect arrangements that in two cases, one a wound of the brachial and the other of the femoral artery, the vessels were tied and the patients saved in the fighting line itself."

CONCLUSIONS.

(1). All advanced nations have *practically* the same character of rifle and projectile, and the remarks applying to one apply *practically* with equal force to all.

(2). That the modern small-bore projectile is capable of producing wounds of both a humane and gruesome nature.

(3). The nature of the wound produced by the small-bore

projectile is dependent upon the range, the character of the structure wounded, or both.

(4). The precise manner in which the explosive action is developed in structures filled with or rich in fluid is still *sub judice.*

(5). The weight of the evidence and the majority of authors favor the hydrodynamic rather than the hydraulic theory.

(6). The new projectile is propelled with greater energy, velocity and accuracy, it is lighter, has a smaller frontage, and is less liable to deformation on striking an object.

(7). The new projectile has less "disabling capacity," and on the whole produces wounds of a more humane character than the old leaden bullets.

(8). By explosive action is meant the damage created in structures outside of the projectile's passage.

(9). The explosive action depends upon the deformation of the projectile, the range and the character of the tissue.

(10). The shorter the range within the first 400 to 600 yards of the projectile's flight, the more pronounced the explosive action.

(11). At 800 or 1,000 yards explosive action is occasionally met with, and then only in the skull or in other parts of the body filled with or rich in moisture.

(12). At a distance of 800 to 1,200 yards the new projectile, as a rule, creates wounds with small orifices of entrance and exit, and little or no explosive action.

(13). That the rotatory action of the projectile may continue after its penetrative movement ceases, and that the character of the wound is partially dependent upon this rotation.

IV. MAMMOTH OVARIAN TUMORS.

REPORT OF A CYST WEIGHING 245 POUNDS.

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In searching the literature of this subject only growths weighing 100 lbs. or more have been considered as mammoth tumors. Reports of twenty-three such tumors have been found. Below are appended brief summaries of these cases chronologically arranged.

No. 1. Ovarian Tumor weighing 106 lbs. Great Elongation of Cervix Uteri and Vagina. By Dr. George B. Gibb. (Transactions of the Pathological Society of London, 1855-6, VII, 273.) This tumor weighed 106 lbs. and was removed *post mortem.*

No. 2. A Case of Enormous Polycystic Ovarian Tumor. By Louis A. Rodenstein, M. D. (American Journal of Obstetrics, 1879, XII, 303.) The tumor weighed 146 lbs. and was removed *post mortem.*

No. 3. An Enormous Ovarian Tumor. By G. D. Neal, M. D. (The Louisville Medical News, 1883, XVI, 305.) This tumor was removed *post mortem*, at which time it contained fluid weighing 119 lbs. She had been tapped for three years previous to her death, in all six times, 487½ lbs. of fluid having been removed in this way.

No. 4. Dr. Goodell, Philadelphia Medical News, 1883, reports an ovarian cyst, removed by operation, weight 112 lbs. Omental and parietal adhesions. Recovery.

No. 5. An Ovarian Cyst weighing 116 lbs. successfully removed. By Howard A. Kelly, M. D. (American Journal of Obstetrics, 1885, XVIII, 795.) In this report Dr. Kelly mentions the two following cases:—

No. 6. Spencer Wells removed a tumor weighing 125 lbs. from a woman, in June, 1873; the patient recovered.

No. 7. Dr. Keith (statement by Emmet) removed an ovarian tumor, weighing 120 lbs. Recovery.

No. 8. Dr. H. A. Kelly, Maryland Medical Journal, 1886, XV, 49, reports an ovarian tumor weighing 100 lbs. successfully removed by operation.

No. 9. Colossal Cyst of the Ovary. By M. Buffet. (Bulletin Société de Médecine de Rouen, 1887-8, 1, 2, s. 117.)

Eighty litres of fluid were withdrawn to relieve impending asphyxiation. Death occurred in forty-eight hours. The autopsy showed a unilocular cyst of the left ovary with subperitoneal fibroma of the uterus weighing 36 lbs. The cyst contained ten litres of fluid; this, added to the eighty litres removed during life, gives a total of 180 lbs. for the ovarian tumor, and 216 lbs. as the combined weight of the ovarian and uterine tumors.

No. 10. Large Ovarian Tumor. By W. L. Estes, M. D. (Transactions of the Lehigh Valley Medical Association, 1887, p. 20.) This was a polycystic thick-walled tumor in which intracystic papillary degeneration had begun. This tumor mass and fluid were calculated to weigh over 125 lbs. On account of adhesions the operation was very difficult, lasting 4½ hours and requiring about 200 ligatures in addition to the free use of the cautery. The woman made an uninterrupted recovery.

No. 11. Ovariotomy. By John Homans, M. D. (In his Three Hundred and Eighty-four Laparotomies for Various Diseases, Boston, 1887.) Case LXXXII; a large ovarian cyst, whose solid and fluid contents (part of which was removed by aspiration a few days before operation) weighed 105 lbs., was removed by operation. Recovery.

No. 12. A Case of Unusually Large Ovarian Tumor. By Charles K. Briddon, M. D. (New York Medical Journal, 1890, VI, 141.) A multilocular cyst weighing 149 lbs. was removed by operation. Death followed about eight hours afterwards.

No. 13. An Enormous Ovarian Cyst. By Dr. Cullingworth. (The Lancet, London, 1891, 1, 999.) Preparatory to operation and in order to diminish shock, aspiration was practiced the day before operation. The fluid was allowed to escape for seven hours, amounting to seventy-four pints of thick, grumous, chocolate-colored fluid containing much blood. Operation was undertaken the next day under ether. The tumor was adherent over the entire anterior surface of the abdominal wall. At the end of half an hour the patient was seriously collapsed and died before the abdominal wound had been closed. The total weight of the tumor and its contents, including that of the fluid removed on the day before operation, was 154½ lbs.

No. 14. Mammoth Unilocular Ovarian Cyst. By Dr. A. M. Cartledge. (American Practitioner and News, 1891.) The patient was thirty years old; first noticed enlargement of abdomen at the age of 16. Circumference at navel 66½ inches. Removal by laparotomy. No adhesions. Recovery. The tumor weighed 111½ lbs.

No. 15. The Treatment of Large Ovarian Cysts:—Report of Case. By Edward P. Davis, M. D. (Annals of Gynæcology and Pædiatry, Philadelphia, 1893, VI, 539.) A multilocular cyst, weighing 160 lbs., was removed by operation. The pedicle was so small as to scarcely require ligation. No adhesions calling for ligation were present and hemorrhage was inconsiderable. The patient partially collapsed during the operation, from which, however, she reacted, becoming conscious. Six hours later, without warning, she died in sudden syncope.

No. 16. An Ovarian Tumor weighing 111 lbs. Removed from a child of fifteen, whose weight was 68 lbs. By Dr. W. W. Keen. (The College and Clinical Record, Philadelphia, 1893, XVI, 134.) A multilocular cyst of the right ovary was removed by operation. There were moderate adhesions to the belly wall and omentum, but the viscera were entirely free. Uninterrupted recovery. This case was especially remarkable because of the age of the child, being only fifteen years and the weight of the tumor exceeding the child's weight by 42 lbs.

No. 17. Enormous Cyst of the Ovary in a young girl of seventeen years. Ovariotomy. Cure. By H. Dayot, Jr., M. D. (Archives Provinciales de Chirurgie, Paris, 1893, II, 559.) An ovarian cyst was removed by operation October 9, 1891, from a girl seventeen years old. On entering the abdominal cavity, about 15 litres of ascitic fluid escaped. There were adhesions to the abdominal wall and omentum but no other visceral adhesions. The operation had to be suspended three times on account of alarming syncope. The operation was completed in 2½ hours and the patient put to bed in a semi-syncopal condition. For three weeks her condition was quite serious, owing to gastric and intestinal complications. She made, however, a complete recovery.

The total weight of the cyst and the fluid removed was 198 lbs.; this included the 15 litres of ascitic fluid, something over 30 lbs. The girl who carried this tumor weighed not quite 66 lbs.

No. 18. Cyst of Ovary. Operation. Recovery. By M. Maritan of Marseilles. (Gazette Médicale de Paris, 1893, LXIV, 2, s. 22.) This ovarian cyst was removed by operation. There were numerous adhesions, and alarming collapse followed the operation, but recovery was complete. Her weight before operation was 117 kilogrammes (254 1-10 lbs.); after operation she weighed 42 kilogrammes, which gives the total weight of the tumor mass removed as 75 kilogrammes, 165 lbs. (This case is referred to by Dr. Harris in his article on Ovariotomy in Shanghai, China, which follows. There

seems to be a discrepancy in the weight of the tumor as reported by him; he says the woman weighed 337 lbs. and the tumor 200 lbs. 14 oz.)

No. 19. Ovariotomy in Shanghai, China. Tumor, 182 lbs. By Robert P. Harris, M. D. (Transactions of the College of Physicians, Philadelphia, 1895, xvii, 71.) This case was operated upon by Dr. Elizabeth Reifsnyder, and was reported in full in the American Journal of Obstetrics, 1895, xxi, 512. The tumor was a cystoma of the left ovary in a small woman, weighing ordinarily 90 lbs.; the total weight of the tumor and its contents was estimated at 182 lbs. She made a good recovery.

No. 20. Enormous Ovarian Tumor, 202 lbs. in weight. Death. Reported by A. M. Garcelon, M. D. (American Gynecological and Obstetrical Journal, New York, 1895, vi, 448.) This tumor was first aspirated by trocar, 132 lbs. of fluid being withdrawn. Five days later the sac with contents, weighing 70 lbs., was removed by abdominal incision. Both ovaries were affected and removed. The cysts were simple and non-adherent. The total weight removed was 202 lbs. The woman died two days after operation.

No. 21. A Very Large Dermoid Ovarian Tumor Successfully Removed. By Skene Keith, M. B., F. R. C. S. (The British Gynecological Journal, 1895-6, xi, 466.) This was a dermoid ovarian tumor, containing, however, 75 lbs. weight of fluid, which was removed by tapping. Some days after, laparotomy was performed and the tumor removed. There were no adhesions except in the pelvis. The total weight of the tumor and contents was more than 100 lbs. Recovery.

No. 22. The Successful Removal of a 125-lb. Ovarian Tumor. By J. G. Lynds, M. D. (Transactions Michigan State Medical Society, 1898, xxii, 147.) A multilocular cyst weighing 125 lbs. was removed by operation. The cyst was adherent to the abdominal wall over its entire portion as well as to the diaphragm, stomach and omentum. Recovery.

No. 23. An Enormous Ovarian Cystoma. By D. Tod Gilliam, M. D. (Medical Record, August 5, 1899.) This ovarian cyst, weighing a little more than 176 lbs., was removed by operation, the patient making complete recovery. There were extensive adhesions to the abdominal wall, which were separated with great difficulty.

To the twenty-three it is desired to add the case of Dr. A. M. Cartledge and myself, operated on May 12, 1897. The tumor sac, with a brief report, was unofficially (not being on the program) exhibited by him at the meeting of the American

Medical Association in Philadelphia, in June, 1897, and will be found mentioned in the Association Journal of December 18th, 1897. It is now reported in full for the first time, in conjunction with and by the courtesy of Dr. Cartledge. The following gentlemen were present at this operation: Dr. J. A. Crosby, Dr. Allen Crosby, Dr. Tom Buckner, Dr. T. N. Willis, Dr. W. F. Beard, Dr. Frank Beard, Dr. T. E. Bland, Dr. G. Lawrence, Dr. C. P. Harwood, and Dr. R. D. Pratt, all of Shelbyville, Kentucky.

The patient was a woman of 37 years, the mother of one child. She was 5 feet 4 inches tall, and of large frame. The tumor had been recognizable for many years; eight years before the woman had gone to Louisville for operation, but her courage failed at the last moment and she had returned home untouched by the surgeon's knife. The tumor continued to increase in size, and pressure effects became so marked that for the last year and a half she had been unable to rest except in the sitting posture. At the time of operation the condition was extreme; respiration was becoming well-nigh impossible, and strength had been much reduced. The enormous abdomen hung down to the knees. The circumference at the navel was 79 inches, and the distance from the ensiform cartilage to the pubis was 49 inches.

The patient's condition made it impossible to think of moving her; so operation was undertaken in a small house in the country, eight miles from Shelbyville, Ky. Unfortunately our anesthetist had missed the train and the gentlemen present as spectators were unwilling to essay the anesthetic, as they did not believe it probable that the patient would survive the operation. I was, therefore, deployed to administer the anesthetic, while Dr. Cartledge attacked the tumor, handicapped by the loss of an accustomed and trained assistant. The woman and tumor combined weighed near 400 lbs., so first we had to nail the rickety table to the floor and brace it with pickets knocked off the garden fence. Before the administration of chloroform was begun, a preliminary tapping was done, with the patient sitting upright on the table edge. Twenty-four gallons of fluid were then withdrawn. The chloroform was given with the patient in a semi-reclining position. After exposing the sac, ten gallons more

of fluid were withdrawn. The operation consumed two hours and was most difficult, because of the extensive adhesions. The parietal wall was anteriorly stuck fast to the sac over perhaps half of its extent, and there were extensive adhesions to the intestines and also adhesions in the loins and pelvis. The adhesions required many ligatures, but were finally all separated, the pedicle was tied off and the sac removed. The cyst was unilocular. A large amount of gauze was packed in over the raw surfaces, dressings were applied and finally a large pillow was placed beneath the binder over the abdomen, replacing in some measure the pressure of the tumor so suddenly removed. The patient left the table with a pulse of 114. She progressed well until the fifth day, when her temperature was normal and pulse 108. At this time symptoms of intestinal obstruction began to manifest themselves and the patient finally succumbed on the morning of the seventh day. The reproduced photographs give a very fair idea of the appearance just before and three days after operation.

In considering the above twenty-four cases it is observed that of the fifteen cases operated on in which recovery took place, the average tumor weight was 129 lbs.; while of the six in which operation was followed by death the average weight was 181 lbs. Case No. 9 should perhaps be excluded from these six, as in it only aspiration was done for the purpose of relieving impending asphyxiation, death following in forty-eight hours; but, as this tumor weighed 180 lbs., the average weight will not be changed.

In nine of these fifteen cases which recovered adhesions were noted as present, either slight or extensive; while in the five fatal cases adhesions were very extensive and troublesome in two cases, were very slight in one case, and were entirely absent in one; in the remaining fatal case (No. 12, Dr. Briddon's) the transcript makes no statement about adhesions. Of the five deaths, three occurred either on the table or within a few hours as a result of syncope (shock). One (No. 14) occurred in two days, the exact condition not being stated; and one in seven days (No. 24) as a result of intestinal obstruction.

In two of the fifteen successful cases preliminary tapping

was done a few days before operation, 75 lbs. of fluid being so withdrawn in one case, the amount not stated in the other. Of the five fatal cases, two were tapped beforehand, seventy-five pints being withdrawn in one case and 132 lbs. in the other.

These considerations are interesting but are unavailing in so far as they might be expected to throw any light on the most important question in connection with this subject, viz.: the wisest and safest method of dealing with mammoth tumors. It is to be hoped and believed that for the future, fewer and fewer of these tumors will succeed in eluding the surgeon's knife at a time when they can be very simply and safely dealt with.

Manifestly but three methods of dealing with these tumors present themselves: 1. Immediate extirpation. 2. Preliminary tapping, followed in a short time by extirpation. 3. Tapping repeated as often as necessary to relieve uncomfortable distension.

Most surgeons will doubtless remain sufficiently radical in their feelings to prefer the risk of immediate death at their hands combined with the possibility of complete cure, rather than the martyrdom to a colossal cyst which would require frequent tappings. Nevertheless it is possible for a woman to reach a good and ripe old age under these circumstances. Dr. Ap M. Vance, of Louisville, has reported a most remarkable case of this kind. The woman began to be tapped at the age of thirty-four years, and this was repeated at intervals, until death overtook her at the age of eighty. In all, she was tapped one hundred and seventy-nine times. While under Dr. Vance's observation, an average tapping measured twelve gallons. It was always a very heavy, mucilaginous fluid, and would have averaged at least 10 lbs. in weight to the gallon. So at each tapping, about 120 lbs. of fluid were withdrawn. Assuming that the amount all along had been about the same, we find that this woman during forty-six years of her life, produced and was relieved of the astounding quantity of 21,480 lbs. of this fluid. On the other hand, many women soon succumb to such a fearful drain, as illustrated by case No. 3, the woman dying in three years, after 487 lbs. of fluid had been withdrawn.

While these cases reported do not distinctly show it, it must be true that extensive adhesions severely compromise the probability of recovery. Unfortunately the extent of adhesions can not be determined beforehand. And even if such determination could be made, the choice of method would still remain an open one for the individual judgment. The extent of adhesions can only be determined after the operation has been begun, as in Dr. Cartledge's case, No. 24. In this case, after the extent of adhesions had been determined, the operation had so far progressed that desistance would necessarily have been fatal, and so it had to be pushed to a radical conclusion.

Under such circumstances marsupialization, as recommended by Pozzi, Péan and Spencer Wells, could scarcely be considered. The process which would be essential for the obliteration or casting out of the sac in such mammoth tumors would necessarily terminate fatally.

In so far as any conclusions can be drawn from a study of these twenty-four cases, the following are submitted:—

1. The fatality from such tumors is directly proportioned to the size of the tumor.

2. Extensive adhesions to the parietes and viscera militate against successful operation, but are second in importance to the size of the tumor.

3. Preliminary aspiration, followed by extirpation in a few days, is apparently no safer than immediate operation.

4. Marsupialization is contra-indicated in tumors of mammoth proportions.

5. Successive tappings are sometimes tolerated over a long period of years, but lead ordinarily to exhaustion and death in a comparatively short time—a few years.

6. When death occurs after operation, it is most apt to be immediate, within a few hours, as the result of shock. If this first danger is passed safely, the fatal issue is apt to be the result of obstruction of the bowel, especially in those cases where extensive adhesions are present.

DISCUSSION.

Dr. A. H. Cordier, Kansas City, Mo.—I wish to place on record a case of which I have here the photographs. The

patient was a colored woman, forty-three years of age. She had fear and dread of a surgical operation, hence operation was delayed for eleven years. The remarkable feature about the case is that we very rarely find an ovarian cyst in a colored woman, comparatively speaking, as compared with fibroids and other forms of solid growths. This tumor weighed 160 lbs.; the woman herself weighed 80 lbs. The patient died from exhaustion on the ninth day following operation.

V. A STUDY OF SIXTY-ONE CASES OF APPENDICITIS, THIRTY OF WHICH WERE OPERATED UPON.

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While my title includes all the cases of appendicitis that I have seen, I shall speak but briefly of those treated medically, laying stress upon those operated upon, for in these the pathological conditions are known to have existed, and no mistake can be said to have been made in diagnosis. While these cases are not large in number, they present features illustrative of the general characteristics of the disease and confirm me all the more in the opinion that appendicitis is a surgical disease. The more salient points in each case are noted, for it is only by presenting the case in this way that the profession, particularly those who oppose the operative treatment, can be brought to look at this as a surgical disease.

Of the medically treated cases, 31 in number, 4 died, a mortality of 13 per cent., and if these cases are all traced, no doubt this mortality rate would be greater. In all these cases operation was advised, though those that died were *in extremis* when I saw them. Of the operated cases, 30 in number, 3 died, a mortality of 10 per cent. But of those lost after the operation, not by the operation, as is so often said, none can by any means attribute the fatality to the operation *per se*. In one case the patient had been treated by a practitioner for five days after general peritonitis had developed;

in another case, also with general peritonitis, the mother delayed operation until the boy's father could reach Asheville; and in the third, death was caused by neglect, though it is likely that he would have died anyway, for he also had a general peritonitis. The four fatal cases of those treated medically were the only ones of that series that developed a more or less general peritonitis, and while they might have died even if operated upon, it is possible that one might have been saved.

It is the duty of the surgeon to offer operation to these cases even if a stigma is cast upon surgery, for it is the patient's only chance for life. We have all seen cases, not only of appendicitis, but other serious diseases, such as rupture of the bladder, in which we could offer but little hope, and yet in which the patient has recovered. In two of the cases reported, very little hope was offered the family, but they accepting, the operation was done, and the patients both recovered.

I shall include in my statistics only those cases operated upon. Of the 30 cases, 16 were females and 14 males. The average age was 23 2-5 years, there being 16 cases 21 years and under, 24 cases 30 years of age and under. Between 21 and 40 years there were 12 cases and 2 over 40. The youngest patient was 5 years old and the oldest was 55. It was very difficult to obtain any history of previous attacks. Many cases had had attacks of severe "cramp colic," so-called, which were probably appendicular, but no importance being attached to them they were forgotten.

In ten cases concretions were found, in one case it being of a thick, gelatinous character, and in four cases the concretion was single. Except in the case of the gelatinous material, the concretions were composed of fecal matter, though in two cases a small amount of vegetable fibre was found imbedded in the mass. In one case the concretion was the shape and size of a cherry stone, and it was only after division and thorough examination that its real nature was determined.

In only one case was vomiting marked, while in five cases there was no vomiting.

In eight cases the bowels were loose, six of these being gangrenous cases. This looseness of the bowels was, in nearly all of the cases, due, I think, to the administration of

cathartics or salines by the family physician before I saw the patients, and contributed not a little to help make the operation a success.

Liver dullness was lost in all the pus cases, and also in one case where pus was not present. In one of these cases the pus was well walled off. In only ten cases could the appendix be palpated with any satisfaction, and in these cases the position and conditions determined by palpation were verified by the operation. Whether this inability to palpate the appendix was due to lack of skill or not, I do not know, but I think in many cases nothing but an indefinite resistance can be felt, particularly when the appendix points southwardly or lies outside of the cecum. The rigidity of the oblique muscles and the distension of the cecum makes it nearly impossible to feel the appendix. One can often approximate its position by the lines of resistance felt, but I doubt if in all cases an absolute diagnosis can be made of the conditions present.

An interesting feature about one of the cases reported was that, though there was no pus present, and only a small amount of serum, the infection was so virulent that I was infected upon the hand and that without a break of the skin. Within an hour after the operation a burning was noticed at one of the hair follicles on the little finger of the left hand, and in eighteen hours a vesicle had formed. Septic chills, with quite a high temperature, were experienced. Cultures from the vesicle showed the presence of the streptococcus pyogenes, staphyllococcus aureus, and one colony of the colon bacillus. A very minute perforation of the tip of the appendix was present in this case.

In many cases the appendix was apparently normal, possibly only congested, but a thorough examination of the calibre after hardening and a microscopical examination of its walls always revealed pathological lesions. I have had opportunity to examine, *post mortem*, three patients whom I had seen during acute attacks, and who had refused operation, the patients dying from other disease. Two of these cases had marked flexions of the appendix and commencing erosion of the walls, with probably bacterial invasion, the other case having adhesions. While these cases might have gone for

years without having a fatal attack of the disease, the probability is that sooner or later a concretion would have formed in those with the flexions, and probably in all three peritoneal infection would have taken place. Of the 27 patients who were treated medically, and who did not die, not all can be said to have been cured. In three cases rupture into the bowel took place, two have masses in their sides at present, six have more or less continual pain in their sides, and the probability is that sooner or later some of them will come to operation.

In all of the cases the McBurney incision was used, and in no case was it very difficult to reach the site of the appendix. In several cases it was necessary to sever the fibres of the internal oblique, but these were all drainage cases; so it made but little difference. In all the cases in which free pus was present, eight in number, drainage was established by gauze. In two cases fecal fistulæ formed, but they were closed by the end of the third week. Through-and-through suturing was used in a great many of the cases, but at present I prefer suturing the layers separately, and using the sub-cuticular suture, all of catgut. Suffering after the operation seems to be much less with the sub-cuticular stitch, probably due to the fact that the cutaneous nerves are not injured as much as in the interrupted suture. In most of the cases the appendix was inverted and buried with a purse-string suture, reinforced by Lembert sutures. All raw surfaces were buried as far as possible.

I do not always advocate the operation necessarily to save life, but in many cases to prevent suffering and loss of time from business. I have now under observation three patients who have attacks at intervals varying from one to six months, and who lose from two days to two weeks, suffer greatly and are necessarily much alarmed as to the outcome, and yet whose condition at the time of the attacks did not justify my insisting upon operation in order to save life. It is true that many of these cases get over their attacks, some never to have them again, but when we consider the low mortality of the interval operation, and the high mortality of the delayed operation, the uncertainty of the exact condition of the appendix, or the outcome of the next attack, I think we are justified in

advising early operation in every case. I have tried faithfully and honestly to look at it from a more conservative standpoint, but the cases, as I see them, all force me to surgery as the only treatment of this disease.

CASE I.—Age 35, M. Two previous attacks, morning temperature usually 97 3-5°. Appendix easily palpated. Pulse rather slow. Constant pain and soreness over the appendix. Constipated, with occasional nausea. Attended to his business affairs as usual up to time of the operation. Tip of appendix gangrenous, small concretion and slight local peritonitis. Cured.

CASE II.—Age 35, F. One previous attack. Had been in bed for three days, with a temperature of 100° to 102°, pulse of 88. Very constipated, almost impossible to move her bowels. Right rectus very rigid, great pain over appendix. The appendix was flexed upon itself, and had probably contained a concretion which slipped out during the manipulations, for there was an eroded spot looking much as though it had been the seat of the mass. The walls of the appendix were full of micro-organisms, mostly cocci, which were not differentiated. Slight local peritonitis. Cured.

CASE III.—Age 40, F. Three previous attacks. Very severe pain, requiring large amounts of morphia. Pulse not much accelerated, temperature at times going to 100°. Operation done in interval. Appendix acutely flexed, the convexity pointing downward. Apparently, at times, fecal matter would fill up the appendix, and the pain was caused by peristalsis, in its effort to extrude the foreign body. No destruction of the mucous membrane had taken place, but the operation was done, and was justifiable in order to save pain. Cured.

CASE IV.—Age 14, M. First attack, though there was a history of an occasional colic. From his history he had had a perforation three days before I saw him. There was but little pain after the colic attending the perforation. Temperature went to 101° the first evening, and steadily went up to 104 2-5°. Pulse going up to 120. Operation was delayed because of desired presence of the father. Free pus in abdomen, general peritonitis, gangrenous appendix, with large concretion partly extruded from it. Died.

CASE V.—Age 24, F. Several previous attacks, all of

them attended with a great deal of pain. Appendix felt distinctly. Nausea and vomiting were marked. Appendix contained débris, and there was a marked stricture near its junction with the cecum. The mucous membrane was entirely destroyed at the tip, and the walls were crowded with cocci. Cured.

CASE VI.—Age 17, M. Four previous attacks. Patient confined to bed for several days from these recurrences, and had also frequent colic lasting several hours. Appendix palpated, and operation during the interval. Appendix six inches long, one-half inch in diameter, and much congested. Stricture at its middle. Its distal end contained mucus and epithelial débris. Cured.

CASE VII.—Age 27, F. Seven previous attacks, most likely to occur at the time of menstruation. Temperature 99°, pulse 80. Had been treated for ovarian disease. Appendix flexed, adherent to the ovary, and three strictures; also small concretion. Streptococci in the calibre, and cocci in the walls. Cured.

CASE VIII.—Age 19, M. Two previous attacks. Great pain and colic every few months, and two attacks which had been diagnosed as appendicitis. Right rectus kept more or less rigid all the time. Operation revealed appendix much congested, flexed upon itself, and adherent to its own base. Cured.

CASE IX.—Age 25, F. One previous attack, which was marked by high temperature and rapid pulse. Had been advised to have operation during attack. Appendix had stricture, closing it entirely, forming a little sac, which contained mucus and epithelial débris. The tip looked as though it might be becoming gangrenous. Cured.

CASE X.—Age 13, M. One previous attack. Temperature 102°, pulse 110. Right rectus muscle very rigid. Sick for three days when I saw him. Appendix flexed with a stricture, and in the end a mucous inclusion, which was almost inspissated. Slight erosion of membrane, and invasion of walls by bacteria. Cured.

CASE XI.—Age 21, F. No previous attack. Seized with pain, suddenly, while at work. Temperature 12 hours later 98°, pulse 100. Tympany, liver dullness lost, not much

pain at time I saw her. Appendix gangrenous, concretion, perforation, free pus and general peritonitis. Cured.

CASE XII.—Age 45, F. One previous attack. Always had had pain at menstrual period. One attack diagnosed as appendicitis, lasting for two weeks, temperature going to 100°. Appendix palpated. Appendix contained a small concretion, was sacculated, and the sac contained a gas-forming bacillus which was not identified. Cured.

CASE XIII.—Age 9, M. Two previous attacks, frequent colics, always localized in right side. Muscle rigid and could feel nothing. Temperature when I saw him 100 1-5°. Appendix angry, red, and the tip was gangrenous. Only local peritonitis was present. Cured.

CASE XIV.—Age 21, M. Two previous attacks. Said to have had an attack in which an unfavorable diagnosis had been given. Felt discomfort in right side all the time. Appendix was flexed, much congested, and there were four strictures. Infiltration of the walls by bacteria. Cured.

CASE XV.—Age 5, F. One previous attack. Former attack lasted for five days. Appendix could be felt, being fully a quarter of an inch in diameter. Operation showed appendix markedly flexed upon itself, adherent to the cecum near its origin, and containing quite an amount of fecal matter. Local peritonitis. Walls showed large number of colon bacilli. Cured.

CASE XVI.—Age 10, M. Several previous attacks. Three weeks before had had an attack, which apparently subsided, then redeveloped. Three days before I saw him temperature commenced to go up; at time of operation was 102°, pulse 96. Pus was walled off. Liver dullness lost. Perforation, concretion large one. Appendix gangrenous. Only local peritonitis. Cured.

CASE XVII.—Age 18, F. Two previous attacks, both at time of menstrual crisis. Had been treated for ovarian trouble. Nothing but an indefinite resistance could be felt in the side, but tenderness was marked. Appendix had an almost impermeable stricture, but the distal end was empty. Slight erosion of membrane, and walls filled with cocci. Cured.

CASE XVIII.—Age 29, M. One previous attack about a

year ago, lasting for two days, which was diagnosed as an attack of colic. During this attack he worked during the first day, though he must have had the perforation early in the morning. Temperature at time of operation was 103°, pulse 116. This was 36 hours after the commencement of the attack. Liver dullness lost. Marked tympany; no pain, though tenderness; appendix gangrenous, full of pus, large perforation. Appendix seven inches long. Free pus and fecal matter in the cavity of abdomen. Drainage used. Fecal fistula for three weeks. Cured.

Case XIX.—Age 20, F. Five previous attacks. Twelve hours after the commencement of the attack her temperature was normal and pulse 120. Great pain, which decreased as the temperature and pulse went up. Thirty-six hours after the attack commenced she was comfortable, pulse 120, temperature 101°. Under the use of opium suppositories her condition became better, though the relation between the pulse and temperature became distorted. The morning of the operation her temperature was normal, the pulse being 108, but during the day both pulse and temperature began to rise rapidly, and general condition looked unfavorable. This was the fifth day of the disease, and operation was delayed because one of the consulting physicians objected to operation. A large amount of free pus and fecal matter in the peritoneal cavity; two perforations in the appendix, which was gangrenous; general purulent peritonitis present, irrigation and drainage. Cured.

Case XX.—Age 16, M. This was his first attack. Three days before operation had severe colic, normal pulse and temperature. Very tympanitic, had vomited once. Morphia relieved him and salts given the next morning caused patient to feel easy. Still tympanitic; no rise of temperature at any time, the pulse never going above 80. Worked in stable the morning of the operation. Tympany becoming more marked, abdomen very tender. At operation, appendix found gangrenous; large perforation through which fecal matter was escaping, general purulent peritonitis, no attempt to wall off the pus. Patient went off the table with a pulse of 80 and a temperature of 99°. Drained. Patient lived for six days and died from neglect. Two hours after the operation he got out

of bed to "cool himself off." Never any suppuration in the incision, but pulse went up gradually to 110, becoming weaker all the time, while the temperature remained normal. I doubt if he was fed half the time, and no care was taken of him in any way.

CASE XXI.—Age 12, F. One attack, two years ago. Present attack lasting for seven weeks, with a temperature never normal, and ranging from 99 2-5° to 102 2-5°, pulse from 90 to 110. Appendix could be felt, enlarged and thickened. Had been in bed during entire attack. Constant pain in right side. Appendix eroded, full of pus, and an impermeable stricture near the cecum. Softened where the first ligature was tied, necessitating a second. Cured.

CASE XXII.—Age 39, F. One attack, six weeks before; commencement of present attack, three days before operation. Temperature went to 99 3-5°, pulse 116 to 120. Marked pain, tympany, and rigidity of right rectus muscle, which stood out very distinctly to the eye. Liver dullness almost lost. Temperature dropped to normal, but the pulse stayed at 120 and not so strong. Much congestion of the intestines, thick plastic fibrinous adhesions, serous effusion. Appendix angry, red, eroded, and stricture. Minute perforation. Pulse and temperature went to normal, and remained stationary. Cured.

CASE XXIII.—Age 12, M. One attack, six months before, and so diagnosed. Colicky pains marked. Operation fourth day, as the temperature seemed to be going up. Appendix curled upon itself, containing inspissated mucus under the microscope, showing cells arranged in whorls, and a few crystals. Stricture half inch from the tip. Local peritonitis. Cured.

CASE XXIV.—Age 29, M. Several previous attacks, diagnosed as indigestion. Slight chill, temperature going to 102°, pulse 90 to 96. Right rectus very rigid. Appendix, congested, angry, red, small amount of pus in tip, which was eroded. Marked local peritonitis. Cured.

CASE XXV.—Age 27, F. Several attacks, for past three years, most apt to occur at menstrual period. Temperature would go to 103°. Pulse 120 to 140. Sweating, slight

Number.	Age.	Number previous attacks.	Vomiting.	Bowels.	Concretion.	Perforation.	Condition of Appendix.	Pus.	Walled off.	Palpation.	Result.	Tympany.	Peritonitis.	Liver dullness.	Sex.
1	35	2	Slight	Constipated	No	Small	Partly gangrenous	No	Partly	Felt	Cured	No	Slight local	Present	M.
2	35	1	Slight	Constipated	No	No	Eroded and flexed, adherent	No	No	Nothing	Cured	No	Slight local	Present	F.
3	40	3	Slight	Constipated	No	No	Acutely flexed	No	No	Nothing	Cured	No	Very slight local	Present	F.
4	14	First	Slight	Loose	Yes	Yes	Gangrenous	Yes	No	Nothing	Died	Yes	General	Lost	M.
5	24	Several	Marked	Constipated	No	No	Erosion, stricture, adhesions	No	No	Felt	Cured	No	Slight local	Present	F.
6	17	4	Slight	Constipated	No	No	Congest'd, strictures	No	No	Felt	Cured	No	Slight local	Present	M.
7	27	7	Slight	Constipated	Yes	No	Stricture, flexed, adhesions	No	No	Nothing	Cured	No	Slight local	Present	F.
8	19	2	Slight	Constipated	No	No	Congested, flexed, stricture	No	No	Felt	Cured	No	Slight local	Present	M.
9	25	1	Slight	Constipated	No	No	Stricture, sacculated	No	No	Nothing	Cured	No	Slight local	Present	F.
10	13	1	Slight	Constipated	No	No	Stricture, flexed, mucous inclusion	No	No	Nothing	Cured	No	Local	Present	M.
11	21	First	Slight	Loose	Yes	Yes	Gangrenous	Yes	No	Nothing	Cured	Yes	General	Lost	F.
12	45	1	Slight	Constipated	Yes	No	Congested, sacculated, contained gas	No	No	Felt	Cured	No	Slight local	Present	F.
13	9	2	None	Constipated	No	No	Angry, red, slightly gangrenous	No	No	Nothing	Cured	No	Slight local	Present	M.
14	21	2	Slight	Constipated	No	No	Congested, flexed, stricture	No	No	Nothing	Cured	No	Slight local	Present	M.
15	5	1	Slight	Constipated	No	No	Adhesions, flexed markedly	No	No	Felt	Cured	No	Slight local	Present	F.

16	10	Several	Slight	Loose	Yes	Yes	Gangrenous	Yes	Yes	Mass in side	Cured	Yes	Local	Lost	M.
17	18	2	Slight	Constipated	No	No	Stricture	No	No	Nothing	Cured	No	Slight local	Present	F.
18	29	1	Slight	Constipated	Yes	Yes	Gangrenous	Yes	No	Nothing	Cured	Yes	General	Lost	M.
19	20	5	Slight	Loose	Yes	Yes	Gangrenous	Yes	No	Nothing	Cured	Yes	General	Lost	F.
20	16	First	Slight	Constipated	Yes	Yes	Gangrenous	Yes	No	Nothing	Died	Yes	General	Lost	M.
21	12	1	None	Constipated	No	No	Stricture, eroded, pus in calibre	No	No	Felt	Cured	No	Slight local	Present	F.
22	39	1	None	Loose	No	No	Eroded and stricture, angry and red	No	No	Nothing	Cured	Yes	Marked local	Lost	F.
23	12	1	None	Loose	Mucoid	No	Stricture and erosion	No	No	Felt	Cured	Slight	Slight local	Present	M.
24	34	Several	Slight	Constipated	No	No	Congested, angry, red, pus in tip	No	No	Felt	Cured	Slight	Marked local	Present	M.
25	27	Several	Slight	Constipated	No	No	Eroded, adherent	No	No	Felt	Cured	Slight	Slight local	Present	F.
26	18	4	Slight	Constipated	No	No	Eroded, adherent	No	No	Nothing	Cured	No	Slight local	Present	F.
27	55	Several	None	Constipated	No	No	Stricture, small pocket, adherent and obliterated	No	No	Nothing	Cured	Slight	Slight local	Present	F.
28	20	8	None	Constipated	Yes	No	Gangrenous	Yes	Partly	Nothing	Cured	Marked	General	Lost	M.
29	22	Several	Slight	Loose	No	Yes	Gangrenous	Yes	Partly	Nothing	Died	Marked	General	Lost	M.
30	30	8	Slight	Loose	No	Slight	Gangrenous, stricture, pus in calibre	No	Slightly	Nothing	Cured	Slight	Marked local	Diminished	F.

chills. Appendix adherent to ovary, eroded, walls filled with cocci. Temperature at once to normal. Cured.

CASE XXVI.—Age 18, F. Four previous attacks, at short intervals. Colicky pains severe, laying her up for several days at a time. Appendix adherent and eroded. Two strictures. Cured.

CASE XXVII.—Age 55, F. Several previous attacks. Temperature would go to 105°. Would be confined to bed from four days to two weeks. Slight tympany. Pulse 116 to 120. Tongue foul, bowels very difficult to move. Appendix adherent, stricture, small pocket near tip, remainder obliterated, pocket eroded. Temperature dropped at once to normal. Cured.

CASE XXVIII.—Age 20, M. One previous attack. Had typhoid fever last year. Intense pain at first, but it stopped. Liver dullness lost; marked tympany. No peristalsis, face dusky. Temperature at time of operation, 60 hours after commencement of attack 101 2-5°, pulse 96. Marked congestion of intestines, and peritoneum. General peritonitis, appendix 7¼ inches long, half inch in diameter, filled with pus, concretion stopping opening into cecum, gangrenous. No drainage. Small fistula for two days, with pus of fecal odor, but no fecal matter, probably not connected with bowel. Cured.

CASE XXIX.—Age 22, M. Several previous attacks, not diagnosed, one in spring, laying him up for three weeks. I saw him the fifth day, temperature 99°, pulse 100, but thin. Has had chills, sweats, and high temperature. No pain after the first day, very tympanitic, liver dullness lost, general peritonitis, large amount of purulent effusion, partly walled off by dense adhesions, intestines very dark. Appendix gangrenous, filled with pus, fecal odor, to effusion, but no apparent perforation. Died from exhaustion.

CASE XXX.—Age 30, F. Seven previous attacks, one six weeks ago, and frequent colic. Operation on fourth day. Had had marked pain with temperature rise, but it had subsided on second day. On third had probably had chill with sweat; temperature 101 2-5°, pulse 108. Abdomen very tense, mass in side. General pain and tenderness. Pulse wiry, tongue foul. Appendix gangrenous, and contained pus, perforation,

marked local peritonitis, nature commencing to wall off, thick adhesions, but not thoroughly walled off. Two days after the operation developed jaundice, due no doubt to a septic perihepatitis, from the extension of inflammation along ascending colon. Cleared up in a few days. Most perfect convalescence, except for this. Practically no discomfort after operation. Cured.

VI. WHAT BECOMES OF THE MEDICINALLY TREATED CASES OF APPENDICITIS?

BY LEWIS SCHOOLER, M. D.,
DES MOINES, IOWA.

Just as long as there are papers being read advocating the medical treatment of appendicitis, it is proper to inquire what becomes of such cases, and the surgeon can, perhaps, give a better answer than the advocate of the medical method, for the reason that he sees some of these cases after they are medicinally cured (?).

First we will consider the large number of cases in which the surgeon is asked to see the patients as a last resort; patients who are dead or dying at the time of the surgeon's arrival. These are the cases where the man of the knife declines to interfere on account of the hopelessness of the case. Certainly these cases can not be said to have suffered at the hands of the surgeon, and the man of medicine can not plead lack of opportunity for a fair trial of his method, for the reason that he has first promised good results with great enthusiasm; later he has not been quite so confident; in another day he has advised waiting a little longer to give his method a fair chance; he has quoted to himself and his friends the long list of cases he carries in his mind that he has successfully treated without operation, and he blandly assures the friends that the patient is in a very bad way, but he has never used any other treatment and all have recovered. Soon, however, the end is apparent to the most obtuse. The explanation is

that obstruction has taken place, heart failure has occurred or peritonitis and sepsis have supervened, all of which is perfectly plain to the laity, and the only individual who is befogged is he who cures all cases by the administration of drugs. If asked for proof of this I beg to refer (by permission, of course) to every surgeon in the land. The picture is an old one to every one of them; they recognize it in the dark as well as in the light; it glows with a pale phosphorescent effulgence that is unmistakable.

There are other cases that are heralded as cures, and they are not an inconsiderable number either; they are the ones in which the golden opportunity has been lost; the surgeon has been beseeched to operate, against his better judgment; and, as the greater portion of them must die, they are charged up to surgery, notwithstanding the patient, friends and medical attendants were apprised of the fact that it was, in all probability, too late, but it served the purpose of transferring it from medicine to surgery. Certainly a great gain to medicine and a further proof that no cases of appendicitis should be operated upon (?).

There are also other cases in which obstruction of the bowel occurs, sometimes very early—cases in which there is firm agglutination of loops of the small intestine. Can any one possessed of even the rudiments of a knowledge of pathology contend that the internal administration of drugs will, in the slightest degree, favorably influence this condition. And yet this condition is repeatedly found by every surgeon. Let the death record show obstruction of the bowels, if you please. The surgeon, however, takes a peep behind the curtain and there beholds a perforated appendix, which he recognizes, and every pathologist recognizes, as the primary cause of the obstruction. He, therefore, moves to amend the record so that it will show a medical failure and the true cause of death. He further desires an amendment to the effect that an early operation would have prevented such a condition of affairs or would have remedied it if already present.

The rule in surgery, approved by medicine and common sense, is that all foreign bodies must be removed, and nature herself insists strongly and persistently upon the observance

of this rule, and yet these medical oracles continue to cry, "Hands off! We cure every case with medicine!" What must be the condition of the neurons in the brain of such an advocate?

A foreign body in an inflamed appendix does not differ in its manifestations from those of a foreign body in any other part of the body. By its continued irritation it produces suppuration, and the tendency is to escape of the pus in the direction of least resistance. The rapidity of the process which produces perforation varies in different patients; not, perhaps, on account of individual peculiarities, but by reason of different circumstances. The infecting material is without doubt of the greatest importance, and has the greatest influence upon the prognosis. This factor seems not to enter into the calculation of those who depend upon medicines The routine is the same. Substances that perforate are found at the time of operation partly within and partly without. In an experience no greater than my own, I have found a pin, a nut shell, grape seeds and a bristle from a clothes or tooth brush. What drug in the pharmacopeia manifests such a preference for the appendix that it will remove pins with the point projecting through the wall? Such a proposition is not only absurd but ridiculous. The proper place for alimentary substances is within the intestinal canal, yet we have seen a perforation at the base of the appendix sufficiently large to permit the escape of practically all of the bowel contents, and at the time of operation such escape was perceptible, not only to the operator, but to all the assistants. Such patients have been known to recover after operation. Can the non-operators demonstrate such results? Certainly not. These cases are, I am convinced, treated as cases of peritonitis, typhoid fever with death during the first week, or any other disease which produces death within a few days.

Appendicitis cases may be divided into several groups, perhaps, with some advantage to this discussion. The above mentioned groups are the ones that die in the hands of the advocates of medicinal methods. They are the ones which produce such faulty recollections in the minds of medical men. To such an extent is this the case that they are entirely forgotten when they come to make up their records.

The assistance of a surgeon would be of great advantage in compiling these statistics.

The last group to which I shall call attention is the one in which the patients do not die on their hands. It is made up of the numerous cases that have recurrences. All of you know them. They are the ones that many surgeons refuse to operate upon until the subsidence of the acute symptoms, or just after the occurrence of an attack, and consequently before the onset of another. Not that the surgeon believes that medicine produces any particular effect, but that he knows the attack is not serious enough to endanger life. He, therefore, waits for the most favorable opportunity to operate; a time in which there is but little danger to the patient. Some of these patients may have recovered from a number of these attacks under medical treatment, or under no treatment, but I have seen very few who were desirous of being cured very often by such means. They usually become very tired of the many, many cures of this character, and find their way to the surgeon's office, where they expect to be cured but once. Some of these, however, halt between two opinions and die in the last attack, an attack that might have been avoided by timely surgical interference. Those who make up this class are calculated to swell the statistics of medical reports immensely, many of them having several mild attacks, and only when they find themselves growing progressively worse do they lose their aversion to more certain methods. While I believe that to-day there is a greater field and better opportunities in internal medicine than in any other, and in no way would I discourage its most strenuous advocates, I am convinced that in appendicitis its limits are well marked and quickly reached, and that the fog and smoke that has been thrown around these cases by gentlemen who enjoy good practices by reason of having seen a few favorable terminations, are now in a fair way to be cleared up by those who have had the opportunity not only to see a large number of cases, but to study the pathology of the disease in both the living and the dead subject.

When we consider that a man with a clientele of two thousand people may only see from one to four cases

annually, and many of them mild cases, it is certainly not begging the question to say that the number is too few from which to gather statistics. Again, many of these pass from individual observation after the first attack. Certainly a case should not be reported as cured when treated medicinally until two years have elapsed since the last attack. Recurring cases should not be reported as cured, nor should chronic cases be placed in the same category, simply for the reason that they are out of bed a greater portion of the time. Most of these find their way into the hands of the surgeon sooner or later, certainly a thing they would not do if they were cured, as claimed by the advocates of non-operative methods. It is not my purpose to reflect upon the honesty or integrity of those who devote themselves to the treatment of disease by the administration of drugs. I am willing to concede to them the same honesty that I accord to my fellow-surgeons, and in this discussion of one of the most important diseases, I predict that the hard facts as disclosed by greater observation and the increased experience of medical practitioners, will inevitably show that the present position occupied by them is untenable.

In conclusion, then, patients who are treated by means of medicine only, either die under treatment or are later cured by operation. To the above there should be noted a single exception, viz.: those cases which are spontaneously cured. This occurs by rupture into the bowel, vagina, bladder or externally. Instances of this method of cure are familiar to all. It is, therefore, singular that in view of such familiar occurrences, these medical gentlemen do not take the hint that nature is so persistently urging upon them and comprehend more clearly the fact that removal of the offending cause, organ and product, is the only rational procedure. It is the only one that is approved by nature, pathology, observation and science.

VII. SURGICAL FEATURES OF APPENDICITIS.

BY HAL C. WYMAN, M. S., M. D.,
DETROIT, MICH.

There are many reasons why surgery of the abdomen has advanced so remarkably within the last twenty-five years. One of them may be the absence of appalling hemorrhage from wounds of the abdominal wall. Another may be the discovery of an almost unknown field for the treatment and cure of disease within the great sac of the peritoneum.

There are some features of appendicitis that are distinctly surgical, and no one would think for a moment of attempting to remedy them by using drugs. If the patient has obstructed bowels, it is clear that this complication is most likely due to some phase of the inflammatory process in which the appendix is involved. Compression of a loop or loops of bowel by inflammatory exudates may be relieved by evacuation of pus; but in case that result does not appear, one must separate the loops of bowel from the inflammatory deposits which bind and compress them. This is done most easily and with little shock to the patient by making the opening in the abdomen large enough to enable the surgeon to use his finger gently in liberating every loop of intestine that is obstructed, and to make room for suturing any rent that may occur in the bowel. Therefore I protest against the teachings of those who insist that the opening in the abdomen need not be larger than is needful for the introduction of one finger. Such teachings have sometimes led to loss of life by making the operator over-cautious about the length of his incision and careless in finding and closing holes he may have torn in the bowel while separating adhesions.

The general peritonitis, which is often a deterrent against any operative procedures whatever, is usually discovered only when the abdomen has been opened to search for the causes of obstruction, and reveals itself by adhesions so extensive and general that separation is impracticable.

Enterotomy should then be performed as a measure quite sure to add to the chances for curing the patient. It may be made at one or more points where a loop of intestine is distended, and, lest the one loop selected be not entirely free above, so that intestinal contents can pass freely from the stomach downward through the fistula, other loops should be opened. If there is any doubt about the enterotomy performing the functions of an artificial anus, the chances for recovery are proportionately diminished.

Simply puncturing the intestine so that gas escapes freely, while very useful when the life of the patient is threatened by tympany, is not making an enterostomy in the full surgical sense. One must cut the bowel open in the least vascular part and stitch it to the parietal peritoneum, so that escaping fecal matter will not pour into the peritoneal cavity.

Abscess as an incident of appendicitis is not always limited to the immediate vicinity of the appendix. Not infrequently a careful palpation of the abdomen before it is opened will discover pus at several points quite distinct and remote from each other. I know a man whose abdomen was opened and the appendix removed along with a pint or more of pus. His symptoms, however, did not improve until another large abscess was opened on the opposite side of his abdomen on the following day. A woman, too, had pus and appendix removed one day, the next day, continuing dangerously ill, a large abscess was found in her pelvis, independent of fallopian tubes or uterus—a sequence of appendicitis.

Such abscesses probably grow out of a more or less general peritonitis, in which a strong effort is made by the peritoneum to limit and encyst pus organisms; and, perhaps, are not in any sense to be confounded with salpingitis, which some surgeons have discovered coincidently with appendicitis.

Ventral hernias after operations through the abdominal wall sometimes make life miserable through fear and apprehension of strangulation; but I have never known a ventral hernia following appendicitis to become strangulated. Operations to cure them are not always successful, no matter how carefully the different layers of the abdomen are sutured. They have their origin, probably, in some impairment of the delicate balance usually maintained between the resistance

offered by the contents of the abdomen to the pressure exercised by the abdominal walls.

After suturing a ventral hernia so that a harmonious blending of the muscles, fascias and tendons results, a change of diet and exercise may do much to guard against relapse. The habitual foods of the patient may have caused deposits of fat in mesentery and omentum, and gases with residual solids in the intestine, which together have established an intra-abdominal resistance, manifested by the yielding of the weak point in the scar in the abdominal wall.

Intestinal fistulæ, not rare sequences to appendicitis, commonly close spontaneously. But sometimes a patient does not heal in that sweet way, and importunes the surgeon to heal, and damns him for not healing it. A cure may be accomplished by cutting a circle about one inch in diameter around the fistula, down through the tissues to the peritoneum. The wound should be daily packed with gauze, so that the peritoneum will be able to retract with the fistula and smooth out the spur which dams the normal progress of the intestinal stream. Several such operations may sometimes be needed before a patient gets well. And they may fail. Then the abdomen may be opened, and the leaking gut found and sutured. If, after the abdomen is opened, a careful probing of the fistula shows a long and tortuous channel, successful closure may be achieved by lateral anastomosis, embracing a proximal part of the channel between two adjacent loops of bowel, so that the discharge will be poured into the intestine.

VIII. REPORT OF A UNIQUE CASE OF APPENDICITIS, WITH SOME THOUGHTS ON TREATMENT.

BY JAMES T. JELKS, M. D.,
HOT SPRINGS, ARK.

On the night of April 26, I received a note from Dr. A. S. Garnett asking me to see a case in consultation at the Arlington Hotel. I found a woman with the following history: On the previous Friday she was feeling very well indeed, and climbed Hot Springs Mountain with a party of friends. Saturday night she was taken ill with pains in the abdomen, which demanded relief. Dr. G. A. Hebert was called to see her, and found her suffering with pain, and a temperature of 100° F. He gave her a dose of morphine hypodermatically, which relieved her suffering. Sunday she had some pain, with a temperature of 101° F. This lasted through Sunday and Sunday night. Monday found her free of fever, with normal pulse, but slightly irritable stomach, so that she vomited whatever she took. Her bowels responded to a cathartic Sunday night and Monday morning. Tuesday her bowels refused to move, nausea increased, temperature and pulse normal and abdomen beginning to distend. Wednesday, bowels constipated and no escape of flatus, pulse and temperature normal, considerable vomiting, with bowels greatly distended, and little or no pain. Wednesday night at 11 o'clock she vomited stercoraceous material. It was at this time that I was sent for, and met Drs. Garnett, Greenway and Hebert in consultation. I found abdomen distended, slight pain in the epigastric and appendicular region. The vomited material was unquestionably stercoraceous in character. I found temperature normal, pulse sixty-five, soft and regular; face of patient bore no mark of suffering or serious illness whatever. The gentlemen present had diagnosed intestinal obstruction, possibly from bands of adhesions. This diagnosis was encouraged by reason of the fact that six years previously she had one ovary removed by

Dr. J. H. Etheridge, of Chicago. Her health did not improve after this operation, and one year ago, while in San Francisco, the other ovary was removed by a local surgeon. At this latter operation many bands of adhesions had been found, hence it was easy for us to believe in the probability of obstruction produced by bands in the present illness. With this view of the case, I advised surgical interference in the hope of saving the life of the patient. The situation was explained to her and her husband, and they readily consented. Thursday morning she was removed to the Ozark Sanatorium, and with the assistance of Drs. T. J. Crofford, of Memphis; A. S. Garnett, G. A. Hebert and John H. Gaines, of Hot Springs, I proceeded to operate.

An incision was made between the umbilicus and pubic regions, two inches in length, through the old scar, and as the omentum was found adherent the incision was extended upwards until I got above the line of omental adhesions. These adhesions were separated by the fingers, and I began to look for intestinal hernia over some band.

The intestines were very much distended with gas and very dark in color—in spots quite black. With the assistance of Dr. Crofford they were rolled out, and covered with warm, moist, sterilized towels. We searched for twenty minutes or more, expecting to find an intestinal hernia over band or bands; failing in this, we turned our attention to the appendicular region, where we found a gangrenous and perforated appendix, which was removed in the usual manner. As the intestines rolled out of the abdominal cavity, we found the peritoneum ruptured in three places from overdistension with gas. The appendix having been removed, the abdominal cavity was thoroughly washed with sterilized salt solution; the intestines also received a thorough washing in the same solution; they were now opened in two places, and by use of rubber gloves on my hands they were easily stripped through the fingers and emptied of gases and feces. These openings in the intestines and the peritoneal ruptures were closed by Lembert sutures, and the intestines replaced in the abdominal cavity. Iodoform gauze was carried to the bottom of the pelvis and around the stump of the appendix; the cavity again washed out with sterilized salt solution, and abdominal

wound closed with through-and-through sutures of silk-wormgut and the patient carried to bed in an exhausted condition. Chloroform was used as the anesthetic, with occasional changes to ether. Dr. Gaines, the anesthetist, was compelled to give her two extra doses of strychine, one-twentieth grain each. Patient died at 8:20 P. M. No *post-mortem* held.

Conclusion.—This case teaches one lesson which was new to me; that a patient may be dying of general septic peritonitis with a normal pulse and normal temperature. In my experience this is unique.

Had I known this patient was suffering from septic peritonitis, as the result of a perforated and gangrenous appendix, I would not have operated, because of the fact that such operations do no good and bring the work of the abdominal surgeon into bad repute. We may set it down as a rule to which there are few, if any, exceptions, that general septic peritonitis of thirty hours' duration always results fatally, and that surgery offers these cases no hope.

The question of treatment of appendicitis is a very serious one, and it is not yet settled. Much has been written on this subject within the last few years. About twenty-five hundred books and monographs have been printed, and the last word has not yet been said. As we see the cases, they may be divided into two classes; those seen early, before pus has formed, or before perforation has taken place, and those seen later, after one or both of these events have occurred.

In forming an opinion as to operative or non-operative treatment, two other factors are also to be taken into consideration, viz.: the mortality when treated medicinally, and the operative skill and technique of the operator; and whether we will or not, these last two elements should have considerable weight in determining the line of procedure. For instance, given twenty cases of appendicitis occurring in course of, say, five years, in the ordinary village or town, the late operation, celiotomy, is decided upon and carried out to the best of his ability by the village surgeon. The patient may recover, but most probably will die, and in that community operation for appendicitis is discredited. The next patient, when early diagnosis is made and operation advised,

remembers the result of the former case, and declines, until perforation and general septic peritonitis is set up, and then consents. The honest surgeon, willing to do all he can to save the patient, and perhaps itching for the celiotomy and consequent prominence which it will give him, undertakes what is practically a hopeless job. Now, in this community, in the long run, which is the safer line for the majority of patients? Are the majority of these patients safer under medicinal or surgical treatment? I am not discussing the ideal treatment, under ideal surroundings and by ideal operators. That is probably settled. We have facts to face, not theories. Then, what are these facts? A patient in an ordinary home, attended by the average village physician, is seen for two or three days, and finally appendicitis is diagnosed, and if he does not operate, the village surgeon is called in. Possibly, in the course of his ten or fifteen years of practice, he has opened the abdomen as many times.

What are the facts here? Simply these: It is now too late for an early ideal operation, and too soon for the late operation. We do not hesitate to say that we believe the majority of these cases will do better under proper medicinal treatment than under surgical interference. Again, given an ideal surgeon, with ideal surroundings, an ideal doctor who makes an ideal diagnosis, viz., in the first few hours of the attack, and who insists upon immediate operation, we dare say the majority of this class of cases, under this set of circumstances, are far safer with immediate section and removal of the appendix. Do we get the cases this way? If we do, and have an aseptic conscience and average ability as surgeons, we say, operate immediately. When the case is from four to six days old, we believe the answer should be different. Here we have a different set of circumstances to meet, and this patient will have a better chance for his life if we wait until the acute symptoms have subsided, and operate between the attacks. We say between the attacks, for it is probable that others will follow. What are the statistics of medicinal treatment of appendicitis? The answer to this question depends on what to the physician attending any case is an unknown quantity, viz.: the character of the infecting agent and the powers of resistance of the individual.

Could we know these conditions beforehand, the course we should pursue would be plain. It may be said that when the case is one of the so-called catarrhal forms of the disease, it will get well under the administration of large doses of sulphate of magnesia. Practically all such cases recover. On the other hand, if the cases are what is known as the "fulminating" kind, eighty-six per cent. die if not subjected to very early operative interference.

Then, we repeat, given a case within the first twenty-four or forty-eight hours of its occurrence, in the hands of a surgeon who operates frequently, and whose technique is correct, with proper assistants and nurses, that patient will be safer with celiotomy than without; but when the case is in the country or village, and seen late in the disease, and seen by the surgeon who does not operate on this class of cases often, we believe the majority of patients will do better without operation than with it.

Doctors are frequently captivated by the work of surgeons in large cities, and when that man says he operated in all cases, the surgeon in a small village thinks he must do so also. He forgets that his opportunities to operate come very seldom, while the other man probably operates for appendicitis, as I have seen them do, two or three times in one day.

The statistics of Drs. John B. Deaver, of Philadelphia, with four hundred and sixty-eight cases in two years, or J. B. Murphy, of Chicago, or M. H. Richardson, of Boston, must be far better than those of the surgeon who opens the abdomen, say six or eight times a year.

This being the case, we believe much harm may be, and is being, done by the cry that every case of appendicitis should be operated on as soon as seen, no matter what the stage of the disease or the skill of the attending physician or surgeon.

The result of operation in this disease depends, again, on whether the section is made during an acute attack or after the attack has passed off. For instance, many operators have a mortality of fifteen to twenty-five per cent. in acute cases, with no deaths in hundreds of cases operated on between attacks.

In a personal communication from Dr. John B. Deaver, he says that in one hundred and ninety-six cases of chronic

appendicitis subjected to abdominal section in the last two years he had no deaths. In two hundred and sixty-four acute cases operated on in the same time (two years) the mortality was 17 per cent. Here we have one of the most successful operators in this country, and yet in acute cases his mortality is 17 per cent. Is the mortality in cases treated medicinally any greater than this?

We can not better close this paper than by giving some statistics recently gathered and published by Dr. Charles J. Whalen, of Chicago (*Western Medical Review*): "Fritz says that 26 per cent., and Stimson that 25 per cent. of all cases of appendicitis prove fatal. According to Fritz, 60 per cent. of one hundred and seventy-six cases of perforated appendicitis died during the first five days, fifty-six during the first four days, twenty-eight during the first three days, and eight during the second day, though a large number of cases of simple appendicitis are said to terminate favorably by resolution. Buel, in 1894, placed the mortality at 5 to 6 per cent., although he had collected four hundred and fifty cases, with only eight deaths. Deaur collected two hundred cases with only two deaths.

"Armstrong says that in the leading Montreal hospital, from 1853 to 1890, before operations were done, that is, in pre-operative days, the mortality was 23.8 per cent. He reports five hundred and seventeen cases, in which the average mortality was 12.8 per cent. Of this number three hundred and eighty-nine were operated on, and one hundred and twenty-eight treated without operation. In this latter list the mortality was 3.12 per cent.; of three hundred and nineteen, eighty-one were interval cases, in which there was but one death; of three hundred and five operated on in acute stages sixty-three died.

"Dr. Kuemmel, of Hamburg, read a paper entitled, 'Relapsing Appendicitis', which was a review of one hundred successful resections of the vermiform appendix. In addition to his own cases, the speaker had collected the statistics of a nearly equal number of cases of relapsing appendicitis in which the operation had been refused. In these cases the morbidity consequent upon the recurring attacks made the second series of cases incomparably worse.

"Dr. Sonnenberg, of Berlin, reported two hundred and fifty operative cases, exclusive of several cases of tuberculous disease of the appendix. There were sixty-six cases of simple, and one hundred and twenty-eight of gangrenous appendicitis. In the two hundred and fifty cases there were forty-three deaths. This mortality of 17 per cent. represents the mortality of the disease, not of the attacks.

"The forty-three deaths were encountered in cases of the perforative form of appendicitis, with complications, as lung and pleural affections, thrombosis, peritonitis, etc.

"Kuemmel, of Hamburg, in his statistics mentions fifty-one cases of the recurrent form, operated upon during the interval between attacks, with but one death. Samuel Lloyd reported five hundred and fifty-eight cases, of which two hundred and twenty-six were operated upon, with one hundred and ninety-two recoveries. In direct contrast to this, two hundred and sixty-five cases were treated conservatively, with only sixty recoveries.

"Hawkins reports two hundred and sixty-four cases which occurred at St. Thomas' Hospital, with one hundred and ninety recoveries, making a mortality rate of nearly twenty-seven per cent.; fifty-nine of the cases had had one or more previous attacks, of which six died, making a mortality rate of ten per cent. under medical treatment.

"Deaur (*Medical News*, December 21, 1895) maintains emphatically that early operation is the only justifiable procedure. He has operated upon two hundred cases, with only two deaths, and these in the first hundred.

"Herman Kuemmel (Berlin *Klin. Woch.*, April 11, 1898) presents a clinical study of one hundred and four cases of recurrent appendicitis, in which operation was performed between attacks. There was not a death in this series.

"Examination of the appendices which had been removed showed that in not one case had the organ become normal after the attack.

"I have been able to collect 6,500 cases, which I have classified under the heading, catarrhal, suppurative and recurrent appendicitis, of which 1,400 were treated medically. Two hundred and fifty-two of these died, a mortality rate of eighteen per cent. Of the remaining 5,100, 987 were oper-

ated upon during the catarrhal stage. Fifty died, a mortality of about five per cent. Of 2,630 cases operated upon during the suppurative stage, five hundred and twenty-six died, a mortality of twenty per cent. One thousand four hundred and eighty-three were cases of recurrent appendicitis, with thirty-five deaths, a mortality of two and one-fourth per cent. Many report series of one hundred or two hundred cases without a single death. This low mortality rate in recurrent appendicitis is due to the immunity to infection acquired by repeated irritation. It will be at once apparent to you that out of 5,100 subjected to operation, 1,483, or twenty-nine per cent., were cases of recurrent form of the disease.

"As a last word, let me close with the following: Dr. W. W. Keen, of Philadelphia, in discussing appendicitis at the Denver meeting of the American Medical Association, concluded his remarks as follows: 'I protest against the use of opium, except in rare cases, as it has a tendency to mask the symptoms of the disease, and leads the patient to the grave. I protest against the argument of Dr. Niles that every case ought to be operated upon and the appendix is never to be left.

"'Out of three hundred *post-mortems*, it was found that one hundred of the individuals had had appendicitis at some time in their lives, and had all recovered from the disease. I challenge the assertion that through surgical operations all but two per cent. of cases can be saved. I challenge any operator in the room to take one hundred well persons, and operate on them without killing more than two per cent. We all fail, gentlemen; I do not know why, but we all fail. I do not believe in operating on all cases of appendicitis.

"'I would rather have a live man with an appendix than a dead one without one. I do not believe with the witty Frenchman that no case is complete without a *post-mortem*. If the patient is no worse after forty-eight hours of observation, let him alone; let him get well.'"

DISCUSSION ON THE PAPERS OF DRS. SCHOOLER, WYMAN AND JAMES T. JELKS.

Dr. J. E. Allaben, of Rockford, Ill.—I have been very much interested in these papers on appendicitis, and particularly the first paper, for the reason that I have had a little experience which emphasizes the point of what becomes of cases of appendicitis treated medically. I have had an unfortunate experience in the last few weeks, with a history similar to that given by the essayist. The patient was a young man, 25 years of age, whom I saw a year ago during a sharp attack of appendicitis. He gave a history of having a sharp attack previous to that time, with localized peritonitis; was attended by other physicians, but had declined operation at both times. A few weeks ago he had a third sharp attack of the disease; there was a moderate acceleration of the pulse, elevation of temperature, and slight vomiting. He submitted to operation, which I performed, and found a great many adhesions about the appendix, which was adherent to the small intestine, and was almost separated in the middle by fibrous bands of adhesion.

The point I wish to speak of is this, that the patient went through the operation nicely, and I congratulated myself that he was going to make a nice recovery. He did not seem to suffer from shock, but he continued to vomit, and I felt sure it was not vomiting from the anesthetic. Then I thought that during the operation there came up into the wound at one time a collapsed portion of the intestine, at another time a distended portion of intestine. This ought to have reminded me that something was wrong other than appendicitis. For several days the vomiting continued, and I was satisfied there was obstruction of the bowel, and again performed a laparotomy, opening in the median line. The intestines were intensely distended in some portions, and the portion of intestine below the obstruction collapsed, tipped over and bound down by adhesions to the mesentery. When this portion of the intestine was released from the mesentery the fibrous bands were found to have held it in a perfect kink, so that there was complete obstruction. These fibrous bands were dissected off with the finger, but too late to save the patient. There was collapse of the distended intestine. I should have known at that time that there was obstruction of the bowel and gone on with my operation to relieve it.

Dr. F. F. Bryan, of Georgetown, Ky.—I was favorably impressed with the paper of Dr. Schooler, and consider it of more importance to the profession and to the laity than the vast majority of papers that come before us. The manner in which he has treated the subject brings to my mind four cases that came under my observation during the present year, upon which I desire to briefly dwell with a view to emphasizing the points brought out by him. Early in January I was called to see a case by telephone, and was informed by a physician that the patient would be dead by night if something was not done. I was away at the time, but about six o'clock that evening I was telephoned for that the patient wanted an operation. On arriving at the house I found him nearly moribund. I at first refused to operate. The patient was conscious, but evidently sinking rapidly. I then agreed to operate. Operation was performed, patient put to bed, and twenty minutes later was dead. This was a case that had received medical treatment.

In May I was called to see a patient in whose case a diagnosis had been made of colic. The patient was seriously sick for several weeks. I was called in consultation with a noted physician, and we both agreed that we had a case of appendicitis. The attending physician failed to meet us, as he was busy with another case. Our diagnosis was not concurred in. Operation was consented to, however, and was performed in July. The patient recovered. This is one instance where medical treatment would have proved fatal in a short time. (Dr. Bryan then narrated two other similar cases.)

Dr. J. O. Malsbury, of Peru, Ind.—I glean from the discussion and papers I have heard that medical treatment in these cases is of little avail. I want to point out that my observation has led me to believe that the trouble with our internal medical men is faulty diagnosis. If the internalist could draw distinctive lines, or make a more positive diagnosis, and observe the symptoms more closely, collect and analyze more intelligently, and then make the diagnosis, we would know whether we had a surgical or medical case. There are ways of making these diagnoses and of analyzing the symptoms which we can learn only by experience.

It seems to me, cases of appendicitis should be classified as inflammatory and mechanical. One gentleman refers to finding the bristles of a brush and pins in the appendix. If we had any way of differentiating as to whether there was a hair or a pin in the appendix, there would not be any practitioner who would treat these cases medicinally. They would be surgical cases. There are methods of determining whether

we have an inflammatory or mechanical case of appendicitis to deal with. In one of the cases referred to, it is very evident that the appendix is not always to blame. The appendix was not to blame in that case.

I want to mention a rather singular case that I had. The patient was a painter; he had never had an attack of lead colic. He had been working on Saturday, and Sunday evening was playing about the house, indulging in family amusements. He had a small hernia, which was easily reducible, but he wore no truss. In his work about the house he suddenly dropped on the knees, and was shortly after seized with an acute pain in the right side of the abdomen. In thirty minutes after this had occurred I found him suffering from shock. The pain was not acute, and I was at a loss to account for the pronounced symptoms, and I found a little knuckle of the hernia, which was not easily reducible. Did he have a hernia which was knotted in the omentum? Was there intussusception, or was there a rupture of the bowel? It would be folly to say that he had a rupture of the bowel. Here is a case with two or three conditions, with two of which he will get well, and with the third condition he will die. I pointed out to him and the family that his condition demanded surgery, and that medicine would do no good. I kept the patient free from opium or narcotics until I could make a correct diagnosis. After five or six hours I had counsel with the family, and impressed upon them the importance of operation. An operation was performed, which revealed eighteen inches of bowel which were swollen, and at the portion where rupture had taken place, the lips of the ruptured part were more than one-quarter of an inch thick. The bowel was necrosed so that there was no chance of stitching it together. Some of you will say, why did you not resect? Resection was thought of, but not done. The entire cavity was infected. I did not perform the operation, but the surgeon who did so thought it was impracticable to resect the bowel; he simply stitched it together as best he could. The abdominal wound was closed, and the patient died a short time after. Those folks did not expect the patient to get well after the third condition was mentioned; they protected me as the general practitioner, also the surgeon. I made the diagnosis in time, and gave them a proper explanation. The surgeon operated with these points in view, and we were both protected.

Dr. Harold N. Moyer, of Chicago.—I am fairly familiar with the medical blunders made in appendicitis; some of them have been recited here. If the surgical section would

have patience with me, I could detail some of the surgical blunders that have come under my observation. I formerly regarded appendicitis as a surgical disease, pure and simple, as soon as the diagnosis was made. I do not take that view now; I have shifted from that position, and when I meet a case of appendicitis, I regard it as belonging to the internalist. The indiscriminate operations that are made in acute appendicitis result in a greater mortality than does the medical treatment; I am not now speaking of the medical treatment that does not recognize danger when it appears; I am not speaking of medical men who do not think that their patient is in danger until he has a temperature of 104–5°, who, perhaps, can not recognize the danger signals of prolonged and persistent vomiting, which I regard as one of the most serious symptoms. I do not mean ordinary emptying of the stomach, but recurrent vomiting. When the danger signs of this disease appear, an operation should be done at once. There are points which govern cases; I speak of cases in hospitals that are seen frequently by medical men. My position has shifted in regard to this disease, and it has shifted in another respect—that is, with reference to operation for appendicitis in the interval. If I am convinced that an acute appendicitis is a medical disease under medical care, I am equally confident that there is no case of recurrent appendicitis that ought not to be operated upon.

Dr. Vincent J. Hawkins, of St. Paul, Minn.—I think there is a whole lot of time and wind wasted on this question of appendicitis. It has been of the greatest benefit to those who have taken part in the discussion, and it gives some of the members an excellent opportunity to work off some of their accumulated energies since they have arrived in this big city. It strikes me that appendicitis is the same as a disease in any other region of the body. In the case of a boil or an abscess medicine is out of the question; you would not give a patient calomel or any other drug for the relief of that condition. Practically, here, if you have a case of appendicitis you have the same thing, and the patient is never cured until he is operated on. If you simply have the colon loaded with gas and a catarrhal condition there, as well as in the appendix, you can relieve the pain. You say it is a case of appendicitis, but it is not septic appendicitis; you have not got an abscess there. If you have, no matter what the condition of the appendix or what it is due to, you do not cure the case with medicine. Nine cases out of ten of appendicitis that I see (and I am a general practitioner) are cured by giving them calomel, cleaning the bowels, getting

rid of the decomposition and gases that are accumulating there. When I get a genuine case of the disease I always send for a surgeon. He is the man to cure my patient. I have not had fifty or a hundred cases of this nature, like some of you, but I am convinced that cases which manifest grave symptoms do not get well by the administration of medicine. I treat my patients as well as anybody, so far as medicinal treatment is concerned. It seems to me we are wasting time and breath in quarreling over the matter of surgical or medicinal treatment concerning a disease that either is not within the province of the surgeon at all or else is absolutely surgical. There is no medicine that I know of that will cure suppurative forms of appendicitis.

Dr. Charles B. Brown, of Sycamore, Ill.—I have the misfortune or fortune to live in a country town. I have not had the experience of city surgeons, so that I can not speak with any great authority on the subject of appendicitis. As to the number of cases of the disease that recover in the acute form, it depends very much on who makes the diagnosis. The gentleman who has the most cases of appendicitis in the country where I live, and I think it holds good in almost every other country town, is the one who has the most cases of typhoid fever, and, as a rule, in four or five days they are out on the street driving their horses. Every bellyache is not an appendicitis. It is a difficult matter to establish just what is a case of appendicitis, and it always will be. The question will always remain unsettled; it can not be otherwise, because of the difference of opinion between practitioners. All country doctors here have heard of this one and that one who had appendicitis and is attending to his business. I am a little bit skeptical in regard to such cases, and I do not believe that they had appendicitis.

I have operated on quite a number of cases, and probably 85 per cent. of them have died. I will tell you why. The average country doctor will not stand behind his fellow practitioner who wants to operate. He will say the patient will get well with medicine. It is an easy thing for a country doctor to step into a family if the regular physician should make a mistake. I have no hesitation in saying that most of the cases of appendicitis upon which I have operated have died because they have been neglected or operated upon too late. The great mortality in these cases, particularly in those I have seen, is due to late operations or neglect. I have been plodding along, and, contrary to some of the opinions that have been expressed, the fact is this: In my community there is a sentiment in favor of operation rather than otherwise.

It is very much easier to operate on a case of appendicitis to-day than it was five or six years ago. Of course, I have no doubt but that there are a great many cases that recover without surgical intervention.

I recall the case of a little girl in whom I advised operation. I went to the house for the express purpose of operating, and they said she might get well without operation. Two weeks later she seemed apparently well; shortly after this she had another attack, was in a condition of shock the next day and died.

Dr. R. E. Haughton, of Richmond, Ind.—I am a surgeon by education, but a doctor by proclivity—that is, I formerly treated disease by remedies, and I do it sometimes now. The *ipse dixit* of certain gentlemen in this country, that we must operate on these cases as soon as the diagnosis is made, I do not accept. Several gentlemen to-day have said it is difficult to make a diagnosis. It is claimed by some teachers and writers that if you have tenderness at McBurney's point, you can safely diagnosticate appendicitis, but not necessarily so. I have operated several times, but have treated more cases medicinally, and a great many of them have recovered without operation. What will you do with the facts? It is very difficult to make a diagnosis of appendicitis and be satisfied that you ought to cut immediately after you have done it. I have seen cases recover, and a few cases die, after the diagnosis was made. I have made *post-mortems* in these cases with a view to determining the facts. I have found an ulcerated tube communicating with the bowel, with inflammation attacking it sufficient in severity to cause death. I have been called a number of times to operate in cases where the patients were so near dead that I declined to do so, as I felt confident it would do no good.

We have been talking about germs as the cause of appendicitis; we would better talk about the inflammation which we have to combat in these cases. We should know definitely the pathology, and when we have an inflammation to contend with, what it will do if it is not arrested. I have seen a number of cases which were clearly and unmistakably appendicitis so far as the symptoms were concerned, and a diagnosis of appendicitis was justified under the circumstances. Now, then, when you have determined the diagnosis, shall you operate when the symptoms do not justify operation? No conservative surgeon would attempt to do that, yet we are told by eminent men in various cities that we should operate at once. I do not accept that, because I stand upon the side of my conscience before God and man as

to what I shall do, and I endeavor to determine the question of operation with the light which I have. I do not care what the cause of the inflammation is, but we are certainly dealing with inflammation when we have appendicitis. I shall not discuss the question of temperature, as to how it begins in the appendix, but it does begin there many times. I do not believe surgery is the only means we have at our command for the relief of this disease, and I do not believe a man should take a knife in his hand when a human life is at stake and when there is a possibility of waiting and seeing what is going to take place.

Dr. J. Henry Carstens, of Detroit, Mich.—I desire to say a few words in reference to this subject. Dr. Wyman, in his paper, alluded to the necessity of breaking up adhesions, and there is no doubt but that, in some cases, this is necessary. In many cases, however, the so-called obstruction and adhesions are simply the result of septic infection, and if we open the abscess and let out the pus, it makes no difference whether we remove the appendix or not, we will stop the septic process, and generally the bowels of these patients will move and we will have no trouble. I know that some strongly advocate breaking up adhesions. I certainly do not in all cases, especially on the part of those men who have not the facilities and experience. They would better not break up all adhesions, but simply open the abscess, remove the appendix if they can, and if not, let it alone, and operate on the patient some time later. They will get better results than 85 per cent. mortality, as mentioned by one of the speakers.

So far as the paper of Dr. Jelks is concerned, I want to say this, that practice in the country is just the same as in the city; there are no more and no fewer cases, they are about the same; there is practically no difference in them. So far as men in the country are concerned, I agree with Dr. Morris when he says that he would rather trust a physician in many of these cases than a surgeon who has never had any experience in abdominal surgery, and in such cases the physician will get better results. But in the light of our knowledge to-day, and in the light of the facilities that we have, no one need to die of this disease, on account of lack of assistance, because every patient, even in the country, can be put on a stretcher, and carried two hundred miles to a medical center, where he can have the best kind of care within five or eight hours. If the country surgeon is afraid to tackle the case for fear of injuring his reputation, let him refer the case to a city surgeon.

So far as the diagnosis is concerned, I hold that the

diagnosis of this disease is easier than that of any other malady. Certainly we make mistakes; we are not infallible. I believe Richardson has made the statement that mistakes are made in about 4 per cent. of the cases, where there is some other condition of the appendix, a malignant growth, an obstruction, or a stricture that requires surgical intervention. But there is nothing that is so easy to diagnosticate as appendicitis. It can be done within a few hours, and those of us who advocate early operations simply say that if you take every case and diagnosticate it as you ought to do, within twenty-four hours, and operate immediately, your percentage of deaths will be less than if you take the same number of cases in the hands of a general practitioner and treat them by poultices, ice-bags, etc. I know there are times when we can not operate; there are times when we do not need to operate, and we would better let patients alone. We all do that; we all practice it; we ought to advocate it; we are talking on general principles.

The remark has been made that patients will not submit to operations. They will submit to anything if you can convince them that you are honest, and that you believe what you say, but if you hesitate they will refuse operation. If you tremble in your boots and think the patient is going to die, certainly that patient is not going to engage you to operate on him. You must express yourself firmly, decidedly and unhesitatingly in these cases. A girl was brought to me with appendicitis, and I said to her, "My good girl, you have got to be operated on; this is a serious matter." Her brother had had appendicitis only three months before, she said, and he got well, and why not she? I said to her that her mother, brother, father, uncles and cousins might have appendicitis and recover, but that her case was entirely different, and that she needed operation. Consent was finally obtained; she was taken to the hospital, the abdomen was opened and was found full of pus. Luckily she got well. It is the manner in which you address these people that influences them to undergo an operation. The Lord hates a coward, the people hate a coward, too; and, if a surgeon, you must have the courage of your convictions.

Dr. Jelks, in his paper, spoke of the first, second, third and fourth days as having something to do with the mortality. I desire to say to my friend Jelks that I believe that is all rot. A good deal depends upon the power of resistance, and a good deal depends, also, upon the man who operates. I will tell you why we have better success in operating to-day than formerly; it is because we are continually pounding away on this subject and talking about it

until people think we have appendicitis on the brain; they think we are cranks. I have been trying to educate the general practitioners for several years to watch for appendicitis in cases where they had not previously looked for it, and they diagnosticate these cases earlier, and send them to surgeons before they are too far gone; and hence we have better results, simply because the general practitioner is more alert and makes the diagnosis early.

DR. S. K. CRAWFORD, of Chicago.—I have been much interested in these papers and the remarks that have been made. I want to offer one or two suggestions, one of which is that the diagnosis is not by any means the most important thing in the treatment of any disease. The cure is the point. One of the papers made a remarkably true statement when it said that the country practitioner is the man who deals with appendicitis first. I want to suggest a cure for these cases, namely, that we should have a hospital in every town in America. No town of five hundred inhabitants should be without a well arranged hospital, good nurses, and a good operating room.

Dr. Brown made the remark that his fellow practitioners would not back him up when he thought it was necessary to operate for appendicitis. Every man in the country will back up his fellow practitioner if they believe he is right. I live in Chicago, but formerly I resided in the country a long time—thirty-one years. I have had the backing of country physicians invariably.

I want to say in reference to a remark made by the last speaker that disease in the country is just the same as it is in the city. A surgeon in the country is just as good as a surgeon in the city, particularly if he has the facilities to do his work, and these he must have. If you are called to a case of appendicitis and you think it needs operation, whether it be the result of a microbe or a macrobe, or whether it be due to a pin or a pumpkin seed, operate and take it out, and your patient will get well.

DR. JAMES B. BULLITT, of Louisville, Ky.—Dr. Carstens, gentlemen, wields a very heavy hammer. He hits hard, and I do not believe that what he has just said, and in so forcible a manner, is subscribed to even by surgeons of his own standing throughout the United States. Therefore what he has said can not be taken as a standard for everybody, because surgeons themselves are not fully agreed about all points in connection with appendicitis. If I understood Dr. Carstens rightly, he meant to say, as Dr. Morris has said, that every

case should be operated on as soon as the diagnosis was made. Do you mean to say that?

DR. CARSTENS.—No, sir.

DR. BULLITT.—I misunderstood you, then. Dr. Carstens told us that the question of the first, second, third or fourth day in this disease was all rot, that it had nothing to do with the case. I will admit that it is all rot, but, gentlemen, the rot is going on in the appendix itself. It is more apt to be rotting on the fifth day than on the sixth. I believe that the large majority of mediocre surgeons or mediocre medical men, who do not possess the skill and judgment of men like Dr. Carstens, have been misled by such axioms as this. I believe it is here that surgeons have killed their thousands rather than medical men, if they have not killed their tens of thousands. If the diagnosis is made early, within the first two days, and the operation is then done, the mortality will, perhaps, be very small. It is true that for the large majority of surgeons throughout the country the mortality will be greatest if the operation be postponed until the third or fifth day, and be then performed, for the mortality of nearly all classes of surgeons of which I speak is confined to cases operated on at this particular period of time. It is too late for early operation, and it is too early for the late operation. It means that the system of the individual has become surcharged with certain morbific material which it is striving to free itself of, and it has not yet acquired a certain amount of immunity against this condition. Now, take an individual at the time when his system is weakest, and load onto it the burden of a surgical operation, and the consequence is that patients die most frequently.

On the other hand, referring to the first series of papers, on what becomes of medicinally treated cases of appendicitis, it depends very much upon who treats them, and how they are treated medicinally. But it has been shown by many men that very few cases taken from the first, particularly the fulminating cases, are living without operation, and but very few of the other class of cases, if treated in a proper way, will result in anything but temporary recovery. Dr. Bartholomew said this morning that if these cases be taken and starved, after the bowel has been cleared out once, and the bowel be allowed to remain perfectly quiescent, many, or nearly all, of these cases will pull through the first attack, and can be operated on in the interval, when the operation is practically absolutely safe. On the other hand, if the impression goes out that we should operate on every case of appendicitis as soon as we see it, every practitioner in the smaller cities and larger ones will be doing it, and the mortality will be greater than it ever has been.

DR. A. H. CORDIER, of Kansas City, Mo.—I am sorry that I did not hear all of the papers, but this is a subject I am much interested in. I rise more especially to controvert some of the remarks made by the speaker who just preceded me. The unfortunate thing about appendicitis surgery is waiting for the so-called operative indications to spring up in the case. I will take the same position as Dr. Carstens and say that if every case was operated as soon as the diagnosis was made, the results would be better. All who have had much experience in operating upon appendicitis and have done *post-mortem* work in cases not operated on, are surprised at the pathology they find at the *post-mortem*. A patient who has been up and around, who has never had an attack of appendicitis, may be taking nitro-muriatic acid and pepsin, etc., for indigestion, and for months will suffer more or less severe pain in the region of the appendix. In a case I operated on just before leaving Kansas City, within six hours following the development of symptoms, I found a perforated ulcer in the appendix. The young man had been taking pepsin. He had used ginger, hot drinks, and things of that kind for months, and the pathological condition going on in the appendix gave way. An early operation saved his life. He had a temperature which was practically normal, with pulse of 84, and yet at the operation I found a handful of muddy-colored fluid which had collected in the region of the appendix, and escaped through the incision. I made a small incision, removed the appendix, instituted drainage, and the young man is recovering. We will find cases in which the entire appendix will slough if we wait for certain symptoms to manifest themselves. An occlusion takes place in the blood vessel; the nutrient supply of the entire organ is cut off, sloughing takes place, and pain subsides as soon as the organ becomes dead; yet a patient without a single adhesion about the appendix will sometimes present symptoms entirely free from danger. Operation, if done early, saves these patients. The unfortunate thing is to wait for operative indications to spring up. If you undertake to wait until the third or fourth day, thinking the patient is getting better, then operate, you will find that the patient will gradually slip from your grasp and be beyond the stage or condition in which it will be safe to operate.

If you have a patient with a temperature of 104° or 105°, with a pulse of 140 or 150, the indications are that sepsis is taking place within, and you will find that such a patient, in the majority of cases, will not get well, and although you will frequently save a case with these alarming symptoms—a bloated abdomen, a pinched face—they indicate a paretic

condition of the intestines. The men who are waiting for so-called operative indications to take place are reporting a mortality of 15 or 20 per cent. The mortality in operations for appendicitis, if done early and timely, say two hours following the diagnosis, should not exceed 2 per cent. in skilled hands. There is no operation in surgery that demands greater discrimination than that for appendicitis. There are many conditions surrounding the appendix, many things to deal with, that are difficult to diagnosticate correctly and save the patient.

Dr. Vincent J. Hawkins, of St. Paul, Minn.—I have considerable hesitancy in offering any suggestions on this subject, after hearing such a free discussion. I recall some cases of appendicitis which stand out in my mind as landmarks; they were interesting to me. I remember my first case when I began practice; I was not sure of my diagnosis then. It was a young man, sixteen years of age, who had recovered apparently from his first attack in a week or two. Later on he had recurrent attacks every month or so, until he had had about twelve of them. I opened the abdomen, found a fluctuating mass, drained, but did not remove the appendix. He recovered from the operation, and in about two months thereafter he had another attack. I took him to Dr. Wyeth, of New York, and while he was getting the patient ready to operate, he had an attack. It was agreed to delay operation until the attack had subsided and operate between attacks. Operation was performed, and the young man recovered. A considerable mass of adhesions was found at the operation, so that it was very difficult to extirpate the appendix.

Speaking of unique cases of appendicitis, I had one a year ago which was rather unusual. I saw the patient about the second day. It was a young woman, twenty years of age, who was taken home from a store, complaining of abdominal pain and vomiting. The abdominal distension was quite severe; patient was decidedly constipated but a movement of the bowel was secured, and the symptoms subsided for a short time. Within forty-eight hours they were renewed. There was no definite or distinct tenderness, except that below the umbilicus there was a sense of resistance. The symptoms were those we find in cases of intestinal obstruction; there was some vomiting. The abdomen was opened in the median line, and as soon as we cut through the abdominal wall we found a mass in the right side, below the umbilicus. In separating the adhesions we opened into an abscess cavity, and a large fecal concretion floated out with the pus. I

was surprised to find that state of affairs. The appendix was found gangrenous. The appendix was wrapped around the small intestine in a manner to produce complete obstruction. As the patient was very low, we dropped the intestines near the abdominal wall, and irrigated, but the patient died in a week, from intestinal obstruction. This case has been reported in the *St. Paul Medical Journal.*

In reference to early operation: A young lady two weeks ago was taken suddenly sick about midnight. She had considerable pain and some fever. The attending physician saw the case at nine o'clock in the morning, at which time the pulse became more rapid, fever was getting higher, and I saw the case with him about eleven o'clock, when the symptoms were becoming more and more aggravated. Consent to operation was obtained, and we operated at two o'clock in the afternoon, finding the appendix free in the abdominal cavity, with two large perforations, some peritonitis, and two concretions. This case would have terminated fatally if it had not been operated on.

DR. EMORY LANPHEAR, of St. Louis, Mo.—I wish, first of all, to combat the idea that operations cannot be done just as safely in the country as in the most elaborately equipped hospital. I have made somewhere about fifteen hundred abdominal sections, the majority of which have been made outside of hospitals. It is not the surroundings which give success, but the care with which the operation is done. It is not the surgeon who does the work, but the man who is clean who gets the results to which we all aspire. Any man who is careful can operate in a country farmhouse with as much safety as in his own private hospital.

The second point which I wish to combat is that every pain in the southwest corner of the abdomen is appendicitis, and that the patient ought to have the belly ripped open. It is not so. Moreover, many of the cases that are unquestionably appendicitis should not be subjected to operation. While this discussion was going on, in order to satisfy myself as to the truthfulness of the statistics as I had them in my own mind, I went out of the room and consulted Osler's Practice, and I find that my memory was correct, in that Osler states emphatically that in appendicitis recurrence is the rule. A large number of cases will recover without operation. Some time ago I had occasion to gather my statistics; I found that in 200 cases of operations for appendicitis, there were 19 deaths; that in 200 other cases of appendicitis in which I was called to operate, but operation was refused, only 14 died. With the Credé inunctions now given for these streptococcus

infections particularly, I believe the mortality in unoperated cases of appendicitis will diminish. Our friend Osler, proceeding after his declaration that recurrence is the rule, says that there are surgeons who claim that getting well in these cases does not mean much; that the patients have recurrences, and are constantly in danger. "This," says Osler, "I feel, is an unduly dark picture." Let us study these cases. I have given them as reserve statistics in my own work. I know that 19 deaths out of 200 operations for this disease is ridiculously high. My explanation is, that I have the courage to go into cases that are apparently hopeless, like the one operated upon by Dr. Jelks. Every such case should be operated, for one life saved out of a thousand of such cases is a triumph for surgery.

According to the St. Thomas Hospital Reports for 1895, there were 190 cases of appendicitis with abscess formation in which there was not a single death; in 38 cases in which abscess was diagnosticated but not operated upon, there were 10 deaths, the rest either rupturing spontaneously or into the intestinal canal. More than this, there were 36 cases in which an acute general septic peritonitis developed from perforation, from leakage without operation, and of this number 27 died; the remainder recovered. Adding all these cases together, taking cases in which you and I would unhesitatingly plunge a knife into the abscess cavity and let out pus, but even including those which our surgeons of to-day do not appear to operate upon, the mortality rate of these 264 cases was only 14 per cent., including all of the bad cases which were unquestionably operable. Do you mean that we should operate upon the whole of these 264 cases, subjecting 190 cases that unquestionably did not need operation to the dangers of abdominal section? I do not believe you will be deceived by any such argument. I defy the essayists to advocate operative intervention in every case of appendicitis as soon as the diagnosis is made, and I ask them to compare their own statements with the 14 per cent. mortality in the 264 operated cases, including 36 cases that were unquestionably operable. Nevertheless, I recognize, as well as the most venturesome surgeon here, the necessity for operation in certain cases of appendicitis, so much so that now I never open the abdominal cavity for other diseases than appendicitis without taking out the normal appendix. It takes but a moment or so to do this, and unless the patient is in great danger during the operation, I believe it is the duty of every surgeon who has the belly open to take out the appendix, and I make it a universal rule to do it. I wish to say, then, as the result of a considerable amount of study of the subject and not a little experience, that

I believe appendicitis is primarily a medical disease, and should be treated by laxatives, by codeine to control pain, and by Credé inunctions over the inflamed area. But hand in hand with the doctor should go the experienced surgeon, not the man who has operated upon one or two cases, but the man who knows when to operate as well as anybody possibly can. Nobody can say definitely that this case is operable and that is not, in every instance. Moreover, I believe that every physician should have in his mind this rule, from which there should be no deviation—when in doubt, operate. Also in relapsing cases operation should be performed. Late statistics, obtainable within the last year, show that nearly 80 per cent. of all cases of appendicitis which recover without operation recur. Fritz says 44 per cent., a London surgeon 23 per cent. Now, of the relapsing cases only 5 per cent. will die from operation; therefore, there being a minimum amount of danger, comparatively speaking, we should operate in every case of relapsing appendicitis, not at the time of the relapse, but shortly after, because it is the third attack which proves fatal usually in recurrent appendicitis.

In conclusion, I wish to oppose the statement of the last essayist that we should not operate in gangrenous appendicitis when there is general peritonitis. Why? Because we can use Dr. Jelks' own argument. If a patient is dying, of course, as Dr. Cordier says, it would be folly to operate; but there are many cases that are deceptive; many cases in which I have opened the abdominal cavity, expecting to find the greatest extent of peritoneal infection, on account of great distension and paralysis of peristalsis; expecting to find acute appendicitis and peritonitis, and found no extensive inflammation of the intestines and an abscess cavity walled off, so that I had no trouble in curing the patient. And yet with all the experience I have had in the treatment of this disease, I was absolutely certain that in some of the cases exactly the same conditions obtained that Dr. Jelks has described in his so-called anomalous case of appendicitis.

Some years ago, at Marion, Kan., a surgeon was called from Kansas City to operate on a child for appendicitis. He said it was too late. The child had general septic peritonitis, and he thought it would die. On receipt of a telegram, I was informed that the patient was worse: Pupils dilated, pulse 140, respiration accelerated. He was clammy and cold, apparently dying. I stated to the attending physician and the parents of the child that it had one chance in its favor for recovery, and that was to operate. Consent was given. We opened the abdomen; found an intense, acute septic peritonitis; we eviscerated the child and washed the intestines

from the end of the duodenum to the end of the sigmoid; there was not an inch which escaped the washing process. Drainage was instituted, and to-day the child is working upon the farm upon which he was taken sick. Such a result in a case of acute septic peritonitis encourages us to operate even in cases that apparently give little or no hope.

DR. WYMAN (closing the discussion on his part).—The field has been so thoroughly covered that there is little to be said. I fancy I see an opportunity, perhaps, for all of us to improve the future of our work, to look after the variety of cases that have been overlooked; and the work which pertains to the treatment of appendicitis is an art. It is something that you cannot get altogether by precept—something that must be learned by actual contact with the case, and with cases. Some one made the remark that we could not tell anything about what there was in the abdomen. In the abstract that is true, but practically men like Deaver, Richardson, and Carstens know what is inside of the abdomen when they place their hands upon it. It is our duty to acquire that art. If we will take a retrospect of the history of surgery, we do not have to look very far before we reach a period when surgery was limited to the extremities, when a man who could do an amputation quickest was considered the ablest and most skillful. The whole face of surgery has changed within a few years, and not only tumors are removed, but deep cavities are explored, in consequence of the development of a very careful manual art. I believe it is a mistake to tie ourselves too closely to statistics. In the remarks of the gentleman from Kansas City we see a lesson. In consequence of his peculiar training, his contact with many of these cases, he was victorious in the very face of defeat. This was an art that could not be acquired by precept alone, but was the direct result of careful study and of learning. I thank you for your careful consideration of my paper.

DR. JELKS (closing the discussion).—I desire to thank the members for their kindly criticism of my paper. I do not like to rest under the implication of being a coward, and I agree with Dr. Carstens that God hates a coward. I have never been accused of cowardice. I believe in surgical operation for appendicitis. Given an early opportunity, with correct diagnosis, and in the hands of an expert operator, the question is settled beyond peradventure, meaning operation. But oftentimes an operation means a mortality of 17 per cent. in the hands of one of the best operators in America, a man

who operates twice or three times a day. I saw him (Deaver) operate on two or three cases a day for ten days in succession. Here there is bound to be the personal equation, which goes a long way toward success. Another thing: We are dealing with facts and not theories. The majority of cases are not in the hands of experts like Deaver, Richardson, Carstens, Murphy and Senn. You can not get the patients to these men, it matters not what you say. These people are in country villages; you can not shift them to Boston, Philadelphia, or Detroit, for the reason that you can not impress them with the importance of it.

I do not want to rest under the implication that my friend Lanphear places me in—that the country offers objections to operations, or that a patient should not be operated upon in the country in preference to a city. I believe the country is a better place to operate if we have all the facilities of a well-equipped city hospital. But we do not have these hospitals in the country. It is not so much the location of the patient as it is the personal equation, the personal expert finger, as an old friend used to say, "fingers with eyes in the ends of them." The ordinary surgeon has no such fingers; I mean the doctor in a town of twenty thousand people. He operates probably on ten cases a year, and not on two hundred cases a year; hence it is impossible for him to do the skillful work of a Richardson, or of a Deaver. It makes no difference about operating as soon as the diagnosis is made; it is against all tenets of the profession; it is against the position taken by every learned man in the profession. But I will mention what has become an axiom, namely, that it is too late for the early operation, and too early for the late operation. This means that there is a time beyond which, when the patient passes it, it is too late to make an early operation. Why? Because certain conditions have taken place; adhesions have formed, walling off, possibly, the peritoneal cavity. It is too late for an early operation; wait a few days longer, and the adhesions are firmer; then make your operation, open the abscess, and the patient gets well. In such cases eight days is a better time for operation than five days. I should say that if you can get every case in the hands of an ideal operator, and operate in twenty-four hours, the mortality would be less. But do we get our cases that way? No. Then, I say, it is better sometimes not to operate so early.

There is another point I wish to call your attention to, which is overlooked sometimes. There is behind the whole business the power of resistance—phagocytosis, if you please. We do not cure anybody except cases of malaria, and quinine does that. The phagocytes do the remainder of the work.

We have two classes of cases, one form in which there is the presence of a tumor, upon which some surgeons place a good deal of significance. What does a tumor mean? It means infection with the staphylococcus; it means pus; it means a slowly growing micro-organism against whose attacks the phagocytes have had time to wall off the peritoneal cavity. Those cases all get well if you do not try to remove the appendix. There is another form of infection from which most patients die. I refer to streptococcus infection. Kittridge Williams tells us that streptococcus infection spreads one-third of an inch an hour when it gets its foothold fastened on the patient; it makes no difference whether the streptococcus gets into the pelvic cavity or around the appendix. What are you going to do in such cases? They will die if you operate, and die if you do not operate. I take it, the gentlemen have not individualized in this discussion. If there is a tumor, operate. You may operate in such cases and your patients will get well. Operate as soon as the diagnosis is made, and if there is not streptococcic infection, the patient will get well. But you will lose, on an average, 17 per cent. of the acute cases; I lose a good deal more than that. Deaver does not lose a case in the chronic relapsing form of the disease, by operating between the attacks.

IX. APPENDICITIS FROM A MEDICAL STANDPOINT.

BY I. N. LOVE, M. D.,
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Every appendix vermiformis, healthy or diseased, is a law unto itself. As its anatomy varies, so also does its pathology. McBurney's point is not always the only point at which to look for the appendix. It may deviate to the left, up or down; for, in fact, it has been found in almost every region of the abdomen, and I once saw a man who, after a long illness passed fecal matter mingled with the urine from his bladder, and was operated upon for supposed prostatic abscess and recto-urethral fistula without avail. A supra-pubic operation revealed a previous appendiceal abscess, the appendix resting upon the bladder, adhesions occurred, and ulceration into

the bladder followed. None but the experienced would have dreamed of looking here for an appendicitis.

Indeed, we must remember that occasionally the various parts of the human anatomy vary as widely as do individuals, viewed from any standpoint. The primary necessity for a case of appendicitis is to have a physician in charge who can make a prompt diagnosis. It may be said that this is the case in all forms of disease, but it is more so for the successful management of appendicitis than for almost any other lesion.

Let us all remember that every case of belly-ache, cramps or pain in the bowels presenting itself is a possible appendicitis; that any history of a previous typhoid fever, inflammation and congestion of the bowels or ovaries, and peritonitis, is a possibly unrecognized appendicitis, and that any victim of indigestion, particularly intestinal, is on the verge of appendiceal inflammation at all times, particularly if he eats to excess or goes on a debauch. Let us keep in mind too that the victim of *la grippe*, the uric acid diathesis, and he who worships at the shrine of the "three L's"—Laziness, Luxury and Lust—is prone to the disease under consideration as well as the athlete. Appendicitis has been classified as catarrhal, ulcerative and perforative, but it is well to realize that an attack of appendicitis is an inflammation of the appendix and it is impossible to draw the sharp lines of distinction.

We doctors must learn, and we must teach the fact to the laity, that an attack of indigestion, cholera morbus, diarrhea, accompanied by pain in the belly, intestinal cramps, etc., must be treated intelligently along the lines of helping nature to get rid of offending material, recognizing pain always as nature's signal that something is wrong, and that it is our duty not to cover up and mask the sign, but to coax and coddle it by simple means, securing its help in locating the cause.

I do not hesitate to say that the doctor who would administer sedatives and pain-killers to a case of pain before making an approximate diagnosis, even though it demanded an all-night visit, would be equally justified in doping and deserting a woman in labor, with a view to obtain his own quota of sleep, without making the examination necessary to determine the position of the child or the stage of the labor.

The class of cases to which I have referred are mistreated unless the attendent secures a thorough clearing out of the bowels (at least of the colon and stomach), before applying remedies which check peristalsis, and this can be best and most easily accomplished by means of hot water used freely internally, from both directions, and externally in the form of a hot all-over bath or the hot, wet pack. The stomach may be well washed out by the drinking of one or two pints of hot water (or the stomach tube); as water is ejected and the washing is complete, another pint or two may be introduced, and quiet upon the part of the patient, with the head low, ice cloth to mouth, mustard plaster over "pit of stomach," will result in the water's retention; stomachic tranquillization will follow, and pyloric relaxation will soon convey the water into the bowel. If now repeated large, high-up enemas (and no syringe is complete without a long rectal tube) be given, of one-half gallon, more or less, of hot water, freely mixed with soap (temperature of water to be 111° Fahrenheit), there will be a pronounced peristaltic wave all down the line, and irritating matters, undigested food, ptomaines, etc., will be carried freely out, and whether we have a case of appendiceal trouble, beginning typhoid fever, or what not, our patient is in better shape. A colon and ileum loaded with fecal matter is best emptied, no matter what we have before us. Lavage of the colon, a free flushing, will start the current from the stomach downward.

As evidencing the value of colon lavage, Bidder, Schmidt, Zolesky, Rosenberg, Krull, Lowenthal, Barlura and others have reported clinically that the flow of bile, urea and indeed all the secretions is greatly increased. The eminent and painstaking specialist in gastro-intestinal disease, Dr. Fenton B. Turck, of Chicago, after numerous careful experiments and laborious effort in the treatment of the abdominal viscera in a large number of patients through the colon, has proven that the high-up introduction of water of a temperature of 131° Fahr. (owing probably to the favorable arrangement of the nervous mechanism and the reflexes of the colon) into the colon increases the blood pressure, the kidneys are stimulated (elimination of urea almost uniformly doubled), hepatic function increased, greatly increased leuco-

cytosis induced, all the effects resulting in a general accelerated metabolism, oxidation and elimination; in short, the result is general cell activity.

Surely an all-night seance, if need be, with the acutely ill, resulting in a clearing away of fermenting food, accumulated fecal matter, ptomaines, etc., etc., whether he be in the initiatory stage of severe appendicitis, typhoid fever, scarlet fever or it matters not what, places our patient in a position more favorable to a mild course of disease and prompt recovery.

I feel that I am justified in claiming the uniformly favorable termination of my intestinal cases for several years to be due to the fact of my having given them the benefit of complete, prompt intestinal evacuation by the means of repeated colon lavage. I have found it well in some of my cases to administer broken doses of calomel triturates ($\frac{1}{8}$ grain), every hour (washed down by a glass of hot water), for ten or twelve hours, followed by a half tumblerful of Apenta water (a most excellent saline cathartic); this in conjunction with the colon lavage.

We must not take the word of the victim or his attendants regarding the evacuation of the bowels, or anything else pertaining to the case, until we have corroborated the evidence by all our five senses. After our diagnosis is made, at least approximately (and I claim that we or our assistant should remain with our patient until this is done), we may be safe in giving some potent pain-reliever if the suffering demand it, but opium in no form should be administered (the same as in administering chloroform or ether) until radical interrogation of the kidneys and general idiosyncrasy establishes the fact of its safety; but it should not be given at all unless we are absolutely sure that we are safe in ruling appendicitis out of our calculations. Three deaths definitely, and possibly more (observed within a year), of uremia, superinduced by morphine in cases of acute indigestion, complicated with crippled kidneys, which were not previously suspected, emphasize in my mind the point made above. Had the hastily summoned physicians met the emergency properly they would have made their call an all-night investigation instead of a hasty and reckless use of the mephistophelian morphine in the

hypodermic syringe. At this point let me urge with all the emphasis at my command that the hypodermic syringe is mightier than the sword in the hands of the ignorant, the lazy, the thoughtless or the backboneless doctor.

After the alimentary canal has been entirely emptied (and not till then) we can thoroughly investigate it, and the complete intelligence and acute sensibility of the patient is essential to this investigation. On general principles I will say that it is very exceptional when a victim of abdominal disease, medical or surgical, is not better, either before diagnosis or after, without opium than with it.

Let it not be forgotten that the pain of an appendicitis may be anywhere in the belly, and it is often least marked at the real site of the appendix (at least in the beginning). We all know how hard it is to locate definitely the intense pain of an ulcerating tooth, and we must keep in mind the scattered reflexes of the abdominal cavity. In a general way the reflected pain is apt to appear near the navel or in the vicinity of the stomach, and not above the diaphragm, as it is in gall bladder and bile duct disturbances, nor to the end of the pelvis, or to the thigh, as in irritation of the urinary bladder, though sometimes (as stated by Morris) the pelvic ganglia are excited to the point of radical appendicitis reflex as along the lines that are disturbed by a stone in the bladder. Palpation with the fingers of both hands, the one inside and the other outside of the abdomen, is the only method for obtaining evidence in a case.

Robert T. Morris, the first authority in America on appendicitis, relates in some of his literature the remark of one of his fellow students in college days, who was instructed to examine a uterus in the dispensary. Says Morris:

"My companion introduced his finger into the vagina, and after poking about for awhile, informed the instructor that the uterus felt just like the middle ounce of mush in a pailful of mush. I have little doubt that to-day this man can make out not only the different parts of the uterus, on palpation, but also the ovaries and oviducts, and perhaps the ureters, if he has taught his finger tips with as much care as he would employ in teaching a setter pup to retrieve birds."

I have been amazed almost uniformly, when called to cases under the care of other medical attendants, to find that they have not made a thorough investigation by first emptying the colon, and then palpating the abdomen with one hand, with the forefinger of the other introduced up through the rectum. Here let me urge a more liberal education of the sense of touch upon the part of the doctor. (It took me ten years to unlearn the excessive importance of the fever thermometer. It is valuable often, but the pulse is a hundredfold more so, whether the lesion be abdominal, pulmonary, cerebral or cardiac, and I fear the clinical thermometer has been largely responsible for the absence of pulse knowledge in our profession during the last two or three decades.) Yes, let us cultivate the "*tactus eruditus*," which will enable us to almost close our eyes and make a good diagnosis. We may take points from those specially skilled diagnosticians in our profession who have made the affliction of blindness intensify their sense of touch and hearing to such a degree as to develop them almost to the point of being wizards of diagnostic wisdom. The eminent Dr. Babcock, of the fair city of Chicago, is a shining illustration of this thought.

I have studied the question under discussion carefully for many years, but three years ago a loved one of mine fell a victim to appendicitis, and for eighteen months suffered constantly, during which time I almost completely relinquished all work, giving attention to this patient. I very naturally devoted myself to the special study and observation of the subject.

I do not propose in this paper to consider or quote the views of other men (and there has been no line written or thought enunciated that I have not carefully read and weighed), but my own conclusions, and I must say they are not of a character to make me proud of my profession as a whole, viewed from the standpoint of appendicitis. It appalls me to recall the advice freely given to me by men very prominent in our profession against surgical interference, some going so far as to say that they had never had a case operated upon, and had never lost a case.

First of all no doctor's dictum is worth a "tinker's dam" regarding the subject unless he has been a persistent student,

and placed himself in a position to have exhausted the entire literature of the subject, and to have seen many hundreds of cases, viewing them calmly, medically and surgically, without prejudice, keeping in mind the thought in relation to the victim, "Put yourself in his place." A prominent authority has well said, "An immense amount of bad advice is given to appendicitis patients by physicians who are not informed, and who do not know the contents of the text-books of our authorities upon the subject. It is not the fault of physicians, but of society, in demanding of physicians so much information upon so many subjects that it is a physical impossibility for them to cover the ground." This may be true, but society does not demand that a physician should assume to know things of which, as a matter of fact, he is completely ignorant.

God help the family or the patient under the care of a universal specialist, who is so busy that he can never go to a Medical Society and get the benefit of other men's views and experiences, and have the helping effect of criticism—some one to rip him up the back, as it were. Moving, as we do, in a narrow groove, going from house to house, where our word is law and few dare say nay, we run great risk of becoming dogmatic autocrats, saturated with the idea that we know it all.

I sometimes think it would be fortunate for us and humanity, as well as science, if every medical case had a pair of doctors instead of one. Then, as in legal cases, where there are always two attorneys pitted against each other, each would be stimulated by the other to his best endeavor. Indeed, considering the supernumerary doctors in every community, there would be fewer idle ones under such conditions.

Unfortunately for us and our patients, we, as it is, are counsel, judge and jury, and, I fear sometimes, executioner. I believe a law should be passed that no capital operation should be performed until at least three to five experienced and well-equipped doctors shall have passed upon the case (the major number to be established surgeons), and no two of them from the same medical college.

I believe, further, that every hospital, private as well as public, should be rigidly inspected by legalized, competent authority, and that not only should every licentiate

to practice medicine be made to pass a proper examination, but that every practicing physician should have to give evidence every five years of his ability to continue in the work, and I firmly believe that unless a doctor be especially skillful and dexterous in the handling of tools, the knife, the scissors, the needle and thread—a good mechanic, an artist—he ought not to do surgery of any kind. A good surgeon, with a deft, delicate hand, had far better graduate from a manual training school, serve a short apprenticeship to a tailor, a carpenter, a sculptor and a draughtsman than to have spent years with the classics and delving into bacteriological lore. John Hunter, Ephraim McDowell, Marion Sims, Lawson Tait, Joe Price and Robert T. Morris are striking examples of the born surgeon, plus work.

And by the way, we may well ask if we are not stuffing too much in our four or five years at Medical College and losing much by relinquishing the old-fashioned apprenticeship of three or four years as understudy under a good preceptor.

If these are the requisites for the general surgeon, they are doubly so for the one who does abdominal work. Except in rare cases the general physician should not do surgery, and the general surgeon should not do pelvic or abdominal surgery any more than he should do eye surgery.

Of course, in sparsely settled neighborhoods for a little while to come, in emergencies, the physician should be equipped to do anything and everything; but rapid transit is eliminating distance so fast that all will soon be in reach of the special skill of those in large centers, but as a matter of fact there is no reason why the country surgeon, if well endowed for the work, should not, with the numerous post-graduate facilities, equip himself well for every demand. Lawson Tait, the provincial surgeon of England, Ephraim McDowell and Marion Sims, the country surgeons of America, should stand as examples to all rural workers as to their possibilities.

In every community self-interest and humanity demand that the doctors get together, and take stock as to their respective capacities and divide up the work. There is not a section in America to-day where there is not a liberal supply

of physicians, and no one man need be so overcrowded with work as not to do good work. We must all remember that the man in our profession who is in the work for the money that is in it is unworthy.

The misfortune is that the numerous wild-cat medical colleges of the land, which have inveigled the untutored and ill prepared from a thousand hills into the realm of medicine, are largely responsible for many evils in our guild.

Unfortunately there are too many doctors who are surgically ambitious; not that they are specially graceful and well equipped along these lines, but the Bob Sawyer spirit in them prompts a love of the chances for the grand stand appeals to the groundlings, the vulgar herd, who think that the man who can carve and leave his trail in blood is the really great man in the profession. As a matter of fact, we should realize that this same vulgar spirit of the mob prompts them to idolize the brutal victor in a prize fight or enjoy a hanging, and we should more of us determine to devote ourselves to the less appreciated but really more skillful field of diagnosis, therapeutics, physiology, and pathology, and leave the realm of surgery to the born mechanical artist, and give him our earnest co-operation and support. I fear sometimes that the prospect of larger fees allures men into the domain of surgery, men whose fingers are all thumbs, and who are as awkward in handling the scalpel as "the man with the hoe" would be in wielding the poet's pen, the painter's brush or the sculptor's chisel.

This brings me to the relation of the specialist in internal medicine and the surgeon. The relation is surely a delicate one. We should demand of the surgeon, if he expects our support, that he be worthy of it by first of all fitting himself for the work by knowledge and experience, gained under master surgeons, and after not less than ten years of general work; we should demand absolutely (and it takes ten years to develop a man's special fitness) that he limit himself to surgery. How else can we co-operate?

Surely if he accepts our case of surgery sent to him as a surgical expert, he should decline our patients who go to him for medical service, allured by the thought that our reference

of cases to him announced his general superiority. Any other course is not honest, but hoggish.

Furthermore, I insist that any case under the care of a good physician, a good diagnostician, competent to know when surgical interference is demanded, and just and generous enough to give his patient the benefit of expert manual and mechanical skill, still needs the constant care of his physician along medical lines, so that he should remain with the surgeon, if not in attendance upon some infectious disease at the time, the two in conjoint care of him equally responsible, no visit to be made (except in emergencies), by either without the presence of the other. The physician is responsible for the diagnosis, for the selection of the surgeon, for the work as done, and is entitled to exactly the same fee as that of the surgeon if his reputation be as great, and larger if it be greater.

Indeed, in all cases a physician, the same as a surgeon, should charge a fee for attendance in harmony with the severity of the case, the responsibility involved, the value of the life, the ability of the patient to pay, and commensurate with his own reputation. In such cases the bills should be rendered synchronously and payments made equally, neither being a preferred creditor. Of course the question of commission can not be discussed by honorable men, but the time has long since passed when the surgeon should deem himself the grand Pooh-Bah and generalissimo of the profession; now such an one runs the risk very properly of being considered a "Jack-at-all-trades" and good at none.

When doctors and surgeons arrive at a full knowledge of not only how to spell the word reciprocity, but its full meaning, and the Golden Rule (As ye would that others should do unto you, do ye even so to them) as well, there will be more good doctors, a smaller number of poor surgeons, and a goodly number of good ones, and the latter will not need to cut rates with each other for surgical operations, and make visits in large numbers in competition with medical men. Keeping in mind our duty to ourselves, to humanity and to God, there need be no trouble regarding the relations of the physician and the surgeon, but I hope I will be understood when I say that I believe the misinterpretation of our code

of ethics protects mediocrity, general incompetence and almost criminal ignorance and recklessness in physicians and surgeons.

Doctors in almost every community are passing as surgeons and expert physicians (protected by the mantle of membership in our societies) who are painfully incompetent, and in many cases they are more devoted to the discussion of our code of ethics than they are to science. Unfortunately nerve, audacity, secret societies, church connections and a love of lucre secure them cases for medication, manipulation and evisceration.

Reckless surgery in incompetent hands has been responsible for much of the aversion of the public to surgical interference in many cases demanding it. Happily for physicians, their work and results from incompetence are not so apparent.

I have taken it for granted that every member of this learned body is familiar with abdominal surgical literature, and those who have made that which is authoritative have written as ideal surgeons working under proper conditions, and I take it that that is what every man who does surgery should be and can be if he tries, and if he can't, then he should abdicate in favor of the man who can.

Considering surgical interference in appendicitis to mean interference by men as capable as Tait, Price, Robert T. Morris, Reed, McMurtry, Jno. B. Murphy, Ochsner, Jno. B. Deaver and such as these, I conclude that appendicitis, from a medical standpoint, means that the earliest possible diagnosis should be made, and the appendix should at once be removed. Handled medically the mortality is about 25 per cent., but of the 75 out of the 100 who recover we can never know how many have recurring attacks, and how many remain through life chronic invalids, or die of other diseases invited by their unhappy condition.

In the hands of ideal surgeons (the expert abdominal surgeons, I mean) the mortality announced (and I have personally observed the truth of the claims made by some of our best men) is from one to three per cent., but even say it is ten or twenty, are we not all anxious to save five, ten or fifteen lives (or even one) out of a hundred? I insist that with the light we now have, and the record now made,

if a surgeon makes a poorer showing there must be something wrong with his methods, and he should, in the name of God and humanity, correct them, and unless he does, he should be amenable to the law.

The surgeon who does not believe in rigid asepsis as applied to his patient, his instruments, his entire paraphernalia and his personality should be eliminated, the same as the physician should be who does not accept, in a judicious way, modern medical methods in the treatment of disease, as for instance who, with the evidence before us, denies his victims of diphtheria the benefit of antitoxin.

At this point let me remark that there is either something in sepsis and infection, or there is not, and if there is, no man should be permitted to attend surgical cases, or parturient women, who gives his services to cases of scarlet fever, diphtheria, or other forms of real or supposed infectious diseases. With the knowledge we now have, I assert (in all kindness) that the physician or surgeon who attends both infectious and surgical or obstetrical cases is either ignorant or reckless, and in either case is open to charges of malpractice, and since the world is well supplied with doctors there is no emergency excuse that can be presented in extenuation.

Are we not correct in insisting that those surgeons who work in sacred regions (speaking anatomically), where a single germ may be fatal, when elsewhere the general result would be but little affected, shall guard themselves against carrying infection, so limit their work and husband their physical and psychical resources as to always be in such good form that their five senses (the sixth also, common sense), but most of all the seventh (moral sense), shall be acutely alert and their hands shall have their fullest cunning? The victim of excessive fatigue, drink, drugs or disease is in poor form for practicing medicine, but least of all surgery.

The half-sick doctor in charge of a patient is an epitome of the blind leading the blind, and all these points are arguments in favor of every medical and surgical worker limiting his labors, and having a pride as the years pass not in doing more work, but better work, and having his patrons say, "How well you do your work," not how cheap, and realize

that there will be one or more months in every year that his services are not available, as he is taking his proper vacation, recreating and seeing how the good workers the world over do their work.

I have seen surgery almost from the time I was sixteen years old—at the hands of masters, too—and I know well, if I know anything, that the happy-go-lucky, devil-may-care, modifiedly maniacal manifestation of Jack-the-Ripperism, operating seemingly for the emotional pleasure, almost suggesting the insanity of Saddism, the knock-down-and-drag-out, the sloppy, unclean type of surgeon, as well as the overworked, fagged-out general family practitioner, and the man who has had only limited opportunities for gaining knowledge of the best pathology, technique and securing proper practice and skill in a general way, should be called down and not permitted to invade the abdominal cavity. Too many men read the records made by the masters, then browse around for a week or ten days in some clinical amphitheatre and fancy themselves full-fledged experts in abdominal work, when, as a matter of fact, they can't interpret the pathologic conditions they may find any more definitely than they can correct them.

In observing the work of Price, Robert T. Morris, Deaver, C. A. L. Reed, McMurtry, Ochsner, Murphy, John Young Brown, and others of our most successful workers in abdominal surgery, I have noticed that the abdominal incision was usually small (about one inch and one-half), the instruments few, and few or no other hands permitted to touch the field, the material or the tools used; and quickness of work was uniform, so that the belly interior was exposed the briefest possible time.

It has been my good fortune during the past two years to have had a goodly number of appendicitis cases under my care. In every case which I have seen *de novo* I have made my diagnosis before leaving the house, and always advised operation, urging it where the conditions and symptoms justified, and in all my cases where surgery has been accepted it has been successful. In cases where I felt that, while an operation was indicated, yet it was not demanded in order to save life, and where it was declined, I have had no deaths, but they

were mostly in children, and I am not sure but that they might have been *typhlitis stercoralis*, though in several cases such impairment of the intestinal digestive functions followed as to suggest the need of operation, but it was declined.

It is difficult to prevail on parents (or any one else, for that matter) to have a child undergo so formidable an operation unless danger is imminent. This fact is a strong argument in favor of prompt operation where the conditions permit, rather than wait for a chance to interfere in the interval between attacks.

I have seen a number of sad cases at the eleventh hour after several days' illness, where no diagnosis had been made until it was too late. He is a brave surgeon and an honest one who will give such an unhappy case a chance for his life. All too frequently surgery is blamed for a death which should be charged to medical incompetence. Only a few days ago a hurried summons took me to an unhappy woman with placenta previa who was not far from death's door, having been treated for weeks with pills and potions, when the evidence was overwhelming that either interference or reference to a surgeon was demanded. My colleague, to whom I referred her, may not be able to save her life, but he deserves all praise for the effort, where the chances are so greatly against him; but what shall we say of the masterful inactivity of her medical attendant?

I have been repeatedly surprised to see cases where the symptoms were not urgent, temperature under 100°, pulse not over 90, and yet operation revealed a gangrenous appendix, which demonstrates clearly the difficulty of determining the conditions without laparotomy. What a changed picture a few hours would have shown in these cases.

I draw from my case book J. M., a fine, robust fellow, aged nineteen, taken on Friday with bellyache; sent for a physician Saturday morning, who gave opiates, visiting him again Sunday morning, continuing treatment. Friends called me at 3 o'clock that day. I found a pulse of 120, temperature 103½°, local and general evidence revealed a clear case of appendicitis. I tried to reach previous physician before giving opinion, but failed, and there was no time to lose. Advised immediate removal to hospital, and operation. This

done at 5 P. M.; suffering of patient intense, temperature 104½°, pulse 140. Dr. John Young Brown, a former pupil of Price and a worthy ex-president of the Mississippi Valley Medical Association, to whom I am under great obligations for uniformly successful service in many cases, operated, revealing a sloughing appendix, a mass of gangrenous omentum, a belly full of serum and organized lymph. He cleansed the cavity with warm normal salt solution, drained with a wick of gauze in rubber tube. In an hour temperature was almost normal, pulse 90, and did not go higher. Young man up and about home at the end of three weeks. Without the operation he would have been dead within twenty-four hours.

A series of chronic cases have come to me which are quite instructive. One will represent the class. W. B. S., a physician of marked intelligence and experience, consulted me for chronic indigestion and general ill health. I examined him carefully, interrogating all his organs, by exclusion locating his trouble in his belly. I had my diagnosis made, but in the hope of having the evidence so strong as to be able to demonstrate to the doctor clearly his condition, I swept out his alimentary canal by purgation and high-up enemas, soon leaving a flat, collapsed belly, a completely empty gut. Without difficulty I demonstrated an enlarged, tender, adherent appendix, which I determined as being the reflex disturber of his entire digestive tract, and the exciting cause of long standing neurasthenia. As Morris says, "an inch and a half incision and a week and a half in bed" returned him to his professional work. But a few months have passed, he has gained considerably in weight, is the picture of health, is happy, and has no "nerves."

The doctor's ill health dated from a supposed typhoid fever of ten years before, when a boy—an overlooked appendicitis. The diagnosis made evident a history of repeated severe attacks of intestinal indigestion, which were really recurring attacks of acute appendiceal inflammation.

This case, with the others of the group, demonstrates the importance of surgical interference from a medical standpoint in these pathological appendices which serve as reflex irritants to the alimentary canal, engendering general indigestion, ptomaine poisoning, auto-infection, neurasthenia, im-

periling life and making it not worth the living, aside from the surgical peril of a recurring inflammatory explosion.

The surgeon was as essential to the proper management of my patient's general intestinal indigestion from a medical standpoint as the dentist would have been had he had a mouth full of decayed teeth.

Were I to have appendicitis in my own person or that of a patient (with or without history of previous attacks), having determined that no chance of perforation was imminent, I would have the intestinal canal cleared out completely, as far as compatible with safety, and diagnosis definitely made along the lines suggested in the beginning of this essay, the pain controlled by hot or cold applications (ice bags, etc., but not too heavy), and by a snug, firm abdominal bandage. Before applying the binder I would cover the entire abdomen with a sheet of oil silk next to the skin, on top of this a layer of cotton batting.

It is surprising how completely we can subdue peristalsis by these means and to the same degree relieve belly pain.

The absolute withholding of all food (not even sick-room slops being permitted) for a week, or even more, will be best in most cases. Many of my colleagues recall the experience of Dr. Tanner, who fasted for nearly or quite forty days some years ago, demonstrating the possibilities in this direction. Our acutely ill patients are all the better for several days of absolute abstinence from all food. The gut being entirely freed from undigested food, fermenting fecal matter, gas and ptomaines, and, nothing being eaten to re-arouse alimentary activity, surely the conditions are ideal for perfect intestinal rest.

Of course, in discussing appendicitis, we must rule out of consideration those cases of typhlitis stercoralis, where there is only a mild degree of irritation or inflammation of the cecum associated with lodgment of fecal matter, whose subjects are usually constipated, and cured within a few days by intestinal flushing, quiet and proper diet. When I hear medical men report a large array of cases of appendicitis cured medicinally I am very prone to think they have taken an exaggerated view of some of their cases of typhlitis stercoralis.

These cases are not infrequently met with in constipated

women; more particularly young boys guilty of errors of diet. The very fact that the majority of these cases terminate favorably and do not recur, as William Pepper remarks, is opposed to the belief that they are all dependent upon appendix disease.

And yet we must ever be on the alert. Even those cases without marked constitutional symptoms, almost normal pulse and temperature, have been known to develop perforating ulceration of the cecum; Fitz reports three such cases, and Osler has reported two.

The truth of the matter is, the very elect can not say as readily what the pathological conditions present about an irritated cecum and appendix are before abdominal section as after. Definite appendicitis is primarily a surgical disease, and if a special abdominal surgeon be available in case I am attacked I shall be operated upon; if not, I shall promptly eliminate, then starve, rest my intestinal canal, apply the abdominal bandage, but not the opium splint (except in the rarest of cases) and trust to God and the *vis medicatrix naturæ*.

In brief, ideal surgery (if available) with 1 or 2 per cent. mortality, is better than 20 or 25 per cent. mortality under medical or expectant treatment, but the latter is to be preferred to the chances of surgical interference at the hands of average general surgeons or practitioners. Under the above plan, if my patient dies, I will feel as my old friend, the late Dr. Guhman, used to say, that "I had let him die honest."

Were I ten years younger I would, on account of my strong convictions on this question, go to Price, Morris, Murphy, Ochsner or some other master and become a cub for a year or more, if necessary, providing my hand could grasp their superb technique, that I might devote my remaining years to all sides of this question. As it is, I shall continue to study and observe these interesting problems in the hope that I may be helpful in the equally important realm of diagnosis as related to their elucidation, and I trust that my co-workers will bear with me if they deem my position as here presented too radical.

DISCUSSION.

DR. A. J. OCHSNER, of Chicago.—I have refrained from discussing the subject of appendicitis twice during this meeting. It is the first time I have ever done so when this subject was discussed in my presence, so that I hope the members will pardon me for saying a few words on it now.

There is one point in regard to the treatment of this disease with which I am absolutely positive I have saved more lives than in all of my practice as a surgeon. I may, therefore, be considered very enthusiastic in scattering this idea and impressing upon you a very important fact. The point is this: The appendix is located at a point at which, if it becomes inflamed and is not disturbed, it will be surrounded and cared for by the surrounding tissues. I have opened the abdomens of many hundreds of patients and have removed their appendices, so that what I may say is not against the surgical treatment, but it is for the purpose of saving the lives of those that have appendicitis. The appendix becomes inflamed and immediately the omentum closes around the appendix; it shuts off the appendix. It does it every time. What happens? If it is not disturbed, and we have catarrhal appendicitis, the catarrhal condition will subside. On the other hand, let us suppose the appendix is about to be perforated by a stone or foreign body; then the omentum will close in about it and we will have an abscess, but the abscess will be circumscribed. We will suppose, on the other hand, that we have an appendix in which the blood vessels have been obliterated, giving us a gangrenous condition of the appendix; but it will still be walled off from the general peritoneal cavity. What happens next? We give the patient milk or some other food, which immediately starts peristalsis; it draws the omentum away from the point and exposes the peritoneal cavity to general infection. Now, you can not give this patient any kind of food but what the intestines will become distended with gas, and by increased peristaltic movements it will be forced through the ileo-cecal valve; it will disturb the conditions there. If we have an inflammation anywhere else, say an inflamed hand, we put it to rest. If we have an inflamed eye we generally close the eye. No matter of what part we have an inflammation we dispose of irritation. Why not do it in the case of the inflamed appendix? Why should we disturb the ileo-cecal valve and appendix by forcing gas through when it can be stopped? Of course, if a patient has eaten a large meal it will be forced through the ileo-cecal valve and out by the

method described by Dr. Love. If the small intestine is to remain at rest you must not put a particle of food into the stomach, and consequently the intestines will remain quiet; they will keep the omentum around there, and the worst that can happen will be a circumscribed abscess, and, if necessary, the general peritoneal cavity can be opened with safety. These patients can be given rectal alimentation, administering some of the concentrated foods, diluted with water, in the form of rectal enemas. After first washing out, the intestines should not be disturbed. I have made use of this method in over two hundred cases that were seen within the first few days of the attack, and so far there has been nothing but a circumscribed abscess. I have opened many cases and found a gangrenous appendix in a circumscribed abscess. I wish to impress upon you the fact that you can not possibly harm a patient, whether you operate or not, by following this plan. If you will go home and follow it you will find many of your professional friends will do the same. Those who have tried this method inform me that their death rate has been reduced greatly. I have used this method since 1892, but did not refer to it in public until about four years ago, and then not very enthusiastically, because I thought it was probably a foolish idea. Two years ago I began to bring this idea before the profession constantly, and since that time I have referred to it every time appendicitis was discussed. I would ask all of you to try it when you get a case of appendicitis, and it does not make any difference whether the patient has gastritis or enteritis. It is just as good and effective if he has a threatening ulcer of the stomach, or a threatening typhoid ulcer. You can not do anything better for the patient; it is wonderful to see how quickly the pain will subside. Patients with gangrenous appendices have no pain after this treatment. I have kept patients for two or three weeks on rectal feeding and they get well. I have also taken patients with enormously distended abdomens, that were apparently hopeless cases, and after using this treatment they have recovered. I repeat that the worst that can follow this treatment is a circumscribed abscess.

Dr. J. O. Malsbury, of Peru, Ind.—The gentleman (Dr. Ochsner) has described what we country practitioners have learned long since by practice, and were we to follow such a plan as has been laid down by the essayist, in the towns of from five thousand to twenty thousand inhabitants, we would not last as long as a June frost. In towns of the size named, where physicians are known, and everybody knows their

business, if they should advocate operation at once to their clientele, they would lose considerable practice, the patients would seek other physicians, and oftentimes these physicians would bring these cases to a successful end without operative intervention. The people would say, here is a physician who advocates a surgical operation, and here is Dr. So-and-so, who handled and treated Mr. So-and-so successfully without operation. These cases are cited and talked about by the people. Perhaps a surgical operation has been done in a desperate case, and the people will compare it with a mild case that could, perhaps, be treated successfully by drugs. This brings up the question whether the practice of medicine is a business or a calling. Personally, I believe that the sooner we all recognize that it is a business, and not a calling, the better off we will be. The leading ministers recognize this fact in their own profession. They are giving something for which they expect to be paid, and we are rendering valuable services to patients, for which we expect to be paid.

Dr. J. E. Allaben, of Rockford, Ill.—I want to testify in a few words to the remarks of Dr. Ochsner. I am more or less familiar with his work; I have seen him operate, and have read remarks by him upon this subject before. I have proceeded along the line described by Dr. Ochsner in two interesting cases that recently came under my observation, both of which demonstrate the efficacy of the procedure. One was a little child, eight years of age, whom I saw in consultation with a colleague, Dr. Markley, of Rockford, about four or five weeks ago. The child was in a desperate condition. There was some exudate around the region of the appendix; there was vomiting, elevation of temperature, increased heart's action, and it was about the sixth or eighth day of the attack. I believe a great many physicians, if they had seen this case, would say that it was necessary to operate at once, but it seemed to me that it was just at that point where it was too late for an early operation and too soon for a late operation. As I have previously remarked, there was the commencement of an exudate to wall off the appendix and to render what pathological conditions were present harmless to the general peritoneal cavity. I advised delay in operation and proceeded on the plan advocated by Dr. Ochsner. The attending physician did not give the child any medicine, neither did I. He did not give even antipyretics to reduce the temperature. Chloral hydrate was given to reduce the pain, and I said we would resort to rectal feeding, giving the little patient nothing by the mouth. I did not see the patient until about seven days afterward, when

the attending physician thought it was advisable to operate, in which opinion I concurred. There was now a pronounced appendiceal abscess. We operated—simply cut through the tissues, opened and drained the abscess—and the child made a rapid recovery.

In another case, similar to the one just reported, except that no abscess had formed, the patient had been sick and had passed through several attacks, years apart, and I was called in consultation to a neighboring town to see the case. He had intense pain in the region of the appendix, and I saw him after the acute symptoms had apparently subsided. It was in the country, four or five miles from the town in which I reside, and the general condition of the patient was better. I advised waiting and feeding the patient by the rectum in the meantime. He was operated on later, and made a good recovery.

Dr. J. A. Witherspoon, of Nashville, Tenn.—As a general practitioner, I want especially to commend the conservative position taken by modern surgeons. I have heard many discussions on appendicitis, and have had to deal with a great many cases of this disease. I have seen many operations done for it, and I desire to state that in the few words expressed by Dr. Ochsner, he impressed me with one fact, so essential to modern surgery—that is, that nature has some methods by which to save the lives of the victims of disease. Gentlemen, there has been a tendency in recent years on the part of modern surgeons to make light of and to ridicule the practitioners of medicine, and to lay all the failures of surgery at the feet of diagnosticians. I desire to say that there is no more trying differentiation in this world than to say when to operate in a case of appendicitis. To me it is one of the trials of professional life, which I shoulder, not as a business, but as a humanitarian. You can not take from us the fact that we stand in a peculiar attitude trying to save suffering humanity, and not merely in the attitude of tradesmen. The expression of Dr. Ochsner, that nature tries to protect by walling off, as it were, this diseased member, is very timely. There can be no question about it. I have repeatedly seen meddlesome interference, when with the ice-bag applied over the appendiceal region, without medication, patients would recover from appendicitis and never have a recurrence. I have seen this in cases that occurred ten and fifteen years ago, and the disease has not recurred.

I rise as a general practitioner to dissent from two statements in the paper of Dr. Love; one is with reference to

immediate operation in all cases, the other is the treatment by opium when operation is not done. In my humble opinion and experience, it would be better for Dr. Love to pursue the course of calling in a surgeon and having an immediate operation than to lull the patient with appendicitis into a seductive sleep, absolutely obscuring the progress and every symptom of danger you have. I am opposed to opium in the treatment of any inflammatory trouble of the appendix. I am opposed to it, not only because it obscures the symptomatology; not only because it acts as an absolute stop-cock to all elimination, but if we are to have any good effect we must have it as we do in all other troubles—by good drainage through the alimentary tract. The question raised by Dr. Ochsner I absolutely endorse *in toto*. After you have once cleaned out the bowel, let it alone. I believe the history of *post-mortem* examinations in cases of appendicitis is that fecal matter is rarely, if ever, found in the ascending colon, to be cleared out after having once moved the bowels. You do not find it; it is not the cause of death. Let these cases alone. Do not give them opium so as to mask the symptoms, permit them to absorb the toxins, and absolutely break down every symptom which will serve as a guide for you in calling a surgeon. If an abscess occurs, or if rupture takes place, operate. But do not be in a hurry. The majority of cases, treated in the manner advised by Dr. Ochsner, will get well without the knife, and if they die, we will bear the odium that surgeons put on us, that we have waited too long.

One other word: When it comes to the treatment of a case of appendicitis, the man who is master of the situation is the one who has made a clear and accurate diagnosis. You must make your diagnosis, and I believe there is more science in making a clear, differential diagnosis through the abdominal wall than there is in making it after you cut in.

Dr. William F. Barclay, of Pittsburg, Pa.—It was my pleasure and privilege to listen to a paper by Dr. John B. Deaver, at Cumberland, Md., about eighteen months ago and I was very much impressed with his conservatism, although I had not met Dr. Deaver before. The reason I was impressed was that my experience in the care of appendicitis cases had taught me that many of them would recover without surgical intervention. In listening to a great many of the operators I had been made fearful, from the positions taken, that every physician who was convinced that he had a case of appendicitis and did not immediately call a surgeon for operation, was guilty of malpractice. I have heard that declaration made

by many operators. This has not been my course. I have been conservative; I have followed in my experience very largely the plan pointed out by the distinguished gentleman of Chicago (Dr. Ochsner), and my results confirm this plan. I wish to say that I have been repaid a thousand times for coming to this meeting and hearing the remarks of Dr. Ochsner. I wish every physician and surgeon in this hall to-day would rise up and say the same thing.

It seems to me unfortunate that extreme positions have been taken by some operators. It has been a disadvantage. When the abdomen is sometimes opened by mistake the surgeon is condemned; this fact is liable to be spread broadcast, and perhaps a life has been lost. We should be conservative; we should be careful of each other's reputations. We need it; it is due from us to each other that we conserve. There seems to be an antagonism between medical and surgical practice, and many surgeons of our country are denominated butchers. It is a mistake. I wish to say that my course has been something like this: When I am satisfied I have a case of appendicitis, the first thing I do is to order a cathartic. I generally select castor oil, if it can be retained, and it generally can be by combining it with some aromatic. I said to Dr. Deaver that that had been my course, as a rule, and he said, "You are right; keep on in that way." My experience has taught that it was right. I am afraid to give opium; I never give it. I am afraid of it just as I am of hypodermic syringes. You will pardon that expression, because I have not much use for syringes. They do a great deal of harm, and especially when used by men of small experience who give hypodermics of morphia when they are at a loss to know what is the matter with the patient. I have often thought of what Dr. Holmes said, that it would be a good thing if hypodermic syringes were in the bottom of the sea.

Dr. S. K. Crawford, of Chicago.—I have enjoyed the paper of Dr. Love very much, and while I endorse his sentiments as being true, I wish to add one or two suggestions in the way of remedies. One of the first and best ways to overcome difficulty is to overcome it. We need to use in the treatment of appendicitis a very essential remedy, the same as we would use in typhoid fever, yellow fever, smallpox and everything else; that is, the sterilized extract of common sense, the condensed cream gathered from the milk of human kindness, and this, when condensed and rendered aseptic, is a grand remedy for everything.

I want to say another thing. I suppose most of you have

heard of Dewey, and the best thing he ever said is applicable to medicine and surgery, and especially to surgeons. Standing on the bridge and looking over, he said, "Gridley, when you are ready, fire!" When you get ready, cut; but don't cut everything.

When Dr. Love was reading his admirable paper, I made notes of a few thoughts that I have heard from this floor several times, and have read a few times. The word equation is frequently used. Equation means an unknown quantity. Let us know what we are doing, and if we apply the solid sterilized extract of common sense, we will know. I refer to the expectant plan of treatment, and we are just as absolutely certain to come out right as we are that the sun rises and sets.

Dr. J. F. Percy, of Galesburg, Ill.—The previous speakers in condemning opium have not offered anything to take its place. All of us have had the experience of being called to a patient who was suffering intensely from pain, and you could not sit down and tell the patient that if he waits a little while, until he is starved for a certain number of hours, his pain will cease. It is true that opium has done an immense amount of harm in cases of appendicitis, and I am certainly no friend of it. Some years ago I saw somewhere (where I have forgotten) a substitute for it in these cases, and I have employed it many times and found it satisfactory. It is simply this: Take half an ounce or an ounce of brandy in a half pint or pint of normal salt solution, warm it to the temperature of the body, and introduce it into the rectum. In a few moments after its introduction the patient will pass from a condition of extreme agony into one of comfort. A general perspiration will break out all over the body, and the condition of the patient will be very satisfactory. Then, it seems to me, there comes a time when we can resort to the methods that have been so well advocated by Dr. Ochsner and others. I deplore very much upon the floor of a convention like this, that any one in the practice of medicine should get up, and with vehemence protest against any line of treatment. We know that we meet with individual cases in which we have got to use a little opium or a substitute for it even in those cases in which it has been so utterly condemned here this morning.

Dr. R. E. Haughton, of Richmond, Ind.—I can only say, after a long experience, worked out on my own line, that I have adopted exactly the plan outlined by Dr. Ochsner this morning, in the diagnosis and treatment of these cases. I

have seen (and Dr. Ochsner has told you he has seen), over two hundred cases in which I have noticed the same thing that he speaks of. This determined for me the conservative position which I occupy in dealing with this question. I am a practitioner who follows the courage of his convictions along the line of diagnosis. I determine what ought to be done, and when I have come to a point in which there is nothing else to be done other than operation, then I operate. A good deal can be done by physiological rest in these cases of appendicitis.

Dr. Ochsner has alluded to nature in the treatment of these cases, and I want to say that nature is the best physician in the world, and that all we have to do as surgeons or physicians is to interpret nature's methods in the cure of our patients, and we will come near doing what is right. That has been my experience for fifty years.

Dr. Love (closing the discussion).—In my closing remarks I wish to say at the outset that the knife is a deadly weapon in the hands of a dirty, unskilled surgeon; opium is likewise a deadly weapon in the hands of a careless, reckless, backboneless doctor, whose blunders we are trying to correct all the time. Nature is blundering all the time; we are trying to correct her blunders. She gives us typhoid fever and other diseases that come to us through impure water. We must not try to imitate nature too closely, but let us make her our partner and use her intelligently. There are several points that have been made as regards the relation of the doctor and the surgeon which, to my mind, are so important as to warrant the particular emphasis laid upon them in my paper. My paper was more a series of suggestions than the detailed treatment of any particular point. I believe in judicious starvation in all acute conditions. I believe Dr. Tanner did well when he fasted for forty days without food. We can, in the beginning of appendicitis and of typhoid fever, keep the gut at rest no better than by starving, having preceded it by the freest purgation possible to secure it. The minute the doctor is called, he should purge for his life. The old-fashioned doctor was not far wrong when he said, puke, purge and sweat. We have lost that to a large extent; we should resume it.

With regard to purgation in the beginning of these cases, castor oil is a good remedy. Then if you starve the patient, a week if necessary, and have full command over him, by keeping yourself in good physical condition, you can hypnotize him and the attendants. You can absolutely command the situation, and as regards the clamor, let it go with the

wind. We are not engaged in the practice of medicine for our health; but it is a noble calling. If you thoroughly empty the alimentary canal, I do not believe you will need opium in one case in a hundred. If you have a violent inflammation to deal with; if your patient is suffering intensely and you have done everything possible, give a dose of opium, but it needs to be given with fear and trembling. That is my opinion about it. Opium checks the elimination, and elimination is the sheet anchor of all diseases, the Big Four road to healthy nutrition, and that means, primarily and lastly, in all acute diseases, starvation — the withholding of food. Nutrition, elimination, tranquilization and disinfection can be secured in ninety-nine cases out of a hundred with hot or cold applications, coupled with judicious suggestion. Place your hand on the patient's head and say, "Wait! I will relieve you; you will get well just as sure as I am alive," and you have done half the work. Every case of appendicitis is a law unto itself and should be so treated. There is a good deal in what my dear old friend, Dr. Crawford, has suggested, namely, that we need to use the sterilized essence of common sense in the treatment of this disease.

Lastly, the Big Four road to health is nutrition (and that means starvation), elimination, tranquilization and disinfection. There you have it, and to the degree that you accomplish that, will you do the best work.

I dare say that if we were to eliminate opium to-day from suffering humanity, people would be better off, considering the reckless manner in which it is used.

X. FURTHER OBSERVATIONS ON THE TREATMENT OF THE ABDOMINAL VISCERA THROUGH THE COLON.

BY FENTON B. TURCK, M. D.,
CHICAGO, ILL.

In a previous communication it was shown that small quantities of hot water (55° C.) introduced into the rectum produced a marked effect on the heart and general circulation, and especially on the abdominal organs. From these results it was evident that hot water introduced, at the temperature

mentioned, into the colon, had an extremely beneficial effect upon the abdominal viscera. Air, hot or cold, forced through a double tube into the colon and allowed to escape, acts not only as a powerful stimulant to the abdominal viscera, but as a species of pneumatic gymnastics for the colon.

In the introduction of hot water into the colon, the following technique is adopted: The patient is placed in the dorsal position upon a table specially devised for the purpose, which is so adjusted that the hips may be raised or lowered to any desired angle without discomfort. The solution employed is usually a 90 per cent. normal salt solution when therapeutic effects of heat and cold are desired. For other purposes, mild antiseptic and medicated solutions may be employed. A soft rubber tube, either single or double, with end and side openings, is introduced into the rectum as far as the sigmoid flexure. At first 200 to 300 c. c. of water, at a temperature of 50° C., is introduced. This is allowed to return through a tube into a conveniently placed receptacle, and the procedure repeated. Every time the water is introduced its temperature is gradually raised until it reaches 55° C.; in all, from 3 to 6 litres are needed. The patient is then allowed to evacuate the bowels, after which he receives similar short treatment with water cooled 2° C. or 5° C. The amount of water introduced and withdrawn and the duration of the treatment depend upon the character of the case.

For continuous irrigation, my double recurrent tube, or needle douche, has answered the purpose best in the hands of gastro-enterologists like Herschell, Treves, Gillespie and others. By continuous irrigation a somewhat different action is obtainable from that already referred to. It is indicated in impaction, acute gastro-enteritis, and during the early stages of appendicitis. A strict observance of technique, judiciously varied in each case, gives the best results.

The mucous membrane of the colon, like that of the throat, seems to be insensible to comparatively high temperature. The sensations within the colon, as to heat or cold, are not very definite. This may, in part, be due to the fact that the colon sensation has been so specialized as to fecal pressure as to lose its heat and cold reaction. That the treatment

through the colon influences not only the general circulation, but also stimulates the actions of the abdominal viscera, and even the cerebral and spinal blood pressure, has long been known. The principle on which stimulant enemata have been employed in opium coma and allied conditions is significant evidence of this. The ano-genital center is notoriously the last to be affected in coma. Numerous instances have been reported where death from opium coma and anesthesia has been prevented by stimulation of this center. Furthermore, stimulation of the ganglia in the walls of the intestines can not fail to produce effect on the spinal and cerebral centers. The increased action of kidneys, liver and other organs after the employment of colonic irrigation is evidence in this direction. This is furthermore shown by the fact that favorable results depend not upon the amount of water introduced, but upon the reaction between heat and cold. Large quantities of water introduced at one time are detrimental; small quantities, frequently repeated, have markedly beneficial effects.

In colonic treatment by water or air, single or double recurrent tubes may be employed, according to the nature of the case. A tube with a single opening at the end is useless, however, for colonic lavage. One designed by me consists of a rubber tube (1 metre long and with a calibre of 23 A. or 85 F.), tapered at the end to an opening with beveled edges. On either side are four small perforations in a row, opposite to each other. Above this is a large side opening with edges so sunken as to prevent irritation in introducing the tube. The distance from the end of the tube to the uppermost opening is one and three-quarter inches. This tube insures rapid return of the water injected, and there is no danger of suction of the mucous membrane by siphonage. There is thus less danger of traumatism and of closure of the end of the tube by the mucous membrane or feces. This tube ensures a more equable distribution of the fluid introduced, and is, therefore, of special value in topical applications or in introduction of food. The double recurrent tube or "needle douche," previously described, will be found of special value when prolonged irrigation or lavage is desired. It has been found particularly useful in obstruction from

whatever cause by Herschell and others. For the same reason it is of value in colon atony, or where hot or cold water is needed as a spray or needle douche. In some cases a tube capable of passing the sigmoid flexure may be needed. Most tubes now made pass only to this flexure, but not beyond. The stiff tubes press upon and so bulge the walls as to give the false impression that the tube has passed through the flexure. The flexible tubes coil up and produce the same impression. My colonic sound and irrigator enables the physician to pass around the colon, even as far as the cecum. It consists of a double-curved metallic tube about 16 inches in length, so made as to be passed through the sigmoid flexure. The tube not only serves as a channel for the return of fluids injected, but also as a sheath for the introduction of a flexible, hollow, metallic cable. The distal end of the cable is surmounted by an olive-shaped, perforated head. This serves as a guide for passing the sound. As the cable is hollow, it may be employed for colonic distention. This, if secured during the passage of the sound, will insure further introduction. The position of the cable tip may be determined by palpation, especially if the cable be rotated. Since the cable is metallic, it can be employed as an electrode. Food, by this instrument, may be distributed over a wide area.

Great objection frequently exists to the introduction of water, especially hot water, into the colon. The hot water produces depression, and even collapse, at times. Warm water is particularly objectionable in this particular. Atony of the bowels from this cause, moreover, is very frequent. Distention of the bowels with water, subsequently withdrawn, would be of value in bowel gymnastics, were it not for the fact that since the water is slow to return, and is not compressible, it causes undue distention.

In treatment of the colon, the object is, first, when atony exists, to secure heat; second, distention; third, contraction and peristalsis, producing gymnastic exercise. For these purposes air often answers better than water. If heat be desired, the air can be heated by passing it from a compressed air tank through a bottle of water heated to the required temperature before passing it into the colon. This method of treatment is useful in atony of the bowels, whether it exists

alone or with obstruction or impaction. Compressed air is used with a double tube introduced into the colon. When the colon is distended, air is allowed to escape through the outlet tube. Air at 55° C. reaches as far as the colon. Nebulization of the colon may be employed; any of the nebulizing mixtures adapted to the colon being used.

Reports of experiments and observations of medical and douche treatment through the colon were also presented.

DISCUSSION.

Dr. William F. Barclay, of Pittsburg, Pa.—The experiments by Dr. Turck are most interesting, and after having had a conversation with the doctor yesterday on this subject, I have been more impressed with the paper than I otherwise would have been, on account of a prejudice which I have against the use of water and other substances in the bowels. I have arrived at the conclusion, from observation, that the indiscriminate use of large quantities of water with syringes is very injurious. I sometimes have felt that it would have been a great boon to medicine if syringes had never been invented. Women use syringes more than men. I have very often, upon advising cathartic medication, been informed by patients that they did not feel like using it, as they had other means, such as injecting large quantities of water into the rectum and large bowel. I was pleased to learn from Dr. Turck that the quantity of water he uses is small, as I am satisfied that this is a great advantage. I believe that the habit of recommending large quantities of water, which so many doctors use, is a dangerous and injurious one. It may be truthfully said that the American people are rapidly becoming a nation of constipates. I remember some years ago, while on a journey, of observing at night, when retiring, on the roof of a barn, "Green's August Flower," and the first thing in the morning that caught my attention was a fence on which was painted, "Use Radway's Cathartic Pills." Every rock, fence, and roof along our main thoroughfares substantiates the fact that cathartic medication seems to be the order of the day. Cathartic medicines rapidly lose their effect, and then patients resort to syringes. Syringes destroy the tone of the muscles of the bowels, and thus set up a constipation which is indeed irremediable. I have tried it myself, at almost the cost of my own life, and I, therefore, speak from experience. In the future, for myself, friends and patrons, I shall resort to regulation of diet and cathartic medication, even though cathartics are at times unpleasant.

Dr. Turck's paper has to me been a very instructive one, especially so in the treatment of appendicitis, as I believe the method of treatment he advises will be successful in preventing, in many instances, the necessity of surgical interference.

Dr. T. Wertz, Evansville, Ind.—I have been very much interested in Dr. Turck's paper, as he has given us an idea which I have learned by experience, that the use of food and water enemas eventually produce a detrimental result, as it is just as reasonable for the bowel to give out as for the teeth. It is just as reasonable that parts of the animal machinery should give out as the parts of any other machine. Many persons are incapacitated for business by obstinate constipation. The stomachs of these people are usually very irritable, and the use of any cathartic medication produces such a serious disturbance that patients are obliged to resort to water enemas. I am a strong advocate of the use of these enemas in constipation, as they act as a decided stimulant in cases where there is a paralysis of the bowel or deficient peristalsis. As to the use of the bowel for the purpose of introducing food, I am satisfied that I have saved, or at least prolonged, many lives with this method.

Dr. Homer M. Thomas, Chicago, Ill.—We are indebted for much of our knowledge of the value of colonic lavage to the experiments and observations of Dr. Turck. There is a general agreement at the present time that the existence of saprophytic bacteria in the intestinal tract is largely the cause of appendicitis. We are greatly assisted in our diagnosis of appendicitis by the use of colonic lavage, and if this method is used in the early or suspected cases of appendicitis, we not only unload the bowel of its accumulated bacterial poison, but we make possible a more accurate palpation of the appendix, aiding us in determining to a large extent the condition and amount of inflammation. It goes without saying that any relief of the bowel from its accumulated material will also favorably influence the prognosis of appendicitis. This is a very important subject, and one meriting further investigation.

Dr. Thomas J. Shuell, Parnell, Iowa.—I have had Dr. Turck treat several cases of stomach trouble for me, and I was very much surprised to see his methods demonstrated. It gave me a number of new ideas as to the value of stomach and colonic lavage. He referred to my paper on "Non-operative Appendicitis," which I read at the Iowa Medical

Society meeting, and which is now in the hands of the printer for publication. For many years I was under the impression that I was the originator of the treatment of appendicitis by means of colonic lavage. The usual method is to unload the cecum, but it has been my endeavor to go farther than that by using very warm water, at a temperature of about 110° Fahrenheit, which not only unloads the cecum and colon, but at the same time excites active peristalsis of the cecum after the first unloading. By means of continuity of tissue this effect extends into the appendix. I believe that a great many, if not all, cases of appendicitis are largely due to impaction of the colon, which produces a feeling of paresis on the right side and a consequent opening of the ileo-cecal valve. By means of a little irritation or jerk, such as riding or jumping, the fecal matter is forced into the appendix. If there is a proper amount of nerve force there, this matter is thrown out, but if a paretic condition exists, the foreign body becomes firmly lodged, bacterial decomposition sets in, with swelling of the mucous membrane, cutting off of the circulation, pus formation and necrosis of tissue.

It has been my practice to give warm colonic flushings every three or four hours for the first day or two, and after having used these flushings for from two to four times the patient experiences a feeling as though something had given way. This means the ejection of the foreign body from the appendix into the cecum. It is impossible to overestimate the beneficial effect of colonic flushings in intestinal diseases, and especially so in appendicitis, and it is well worth every man's while to give this method a fair trial.

Dr. Turck (closing the discussion).—I simply wish to reiterate the object of my experimental work which I have presented to you to-day, and to emphasize the value of the colon as a means of affecting the abdominal viscera. Hot water is one of our most powerful therapeutic agents, and it is not so much the quantity as the temperature which procured the proper reaction. It is detrimental to use large quantities on account of the stretching of the colon, but small quantities at a high temperature should be used, as heat draws out the water from the walls of the bowel, and this increases the original quantity injected.

As the temperature of the water is increased, the temperature of the body is correspondingly increased, sometimes as high as two or three degrees. We reduce this temperature by means of cold water, which acts like heat, that is, it is a vaso-motor stimulant. As fecal matter is the normal stimu-

lant of the bowel, we can by artificial stimulation produce the same peristalsis. By experimenting upon dogs I found that this could be done in most cases by the use of water. Even small quantities are in some cases detrimental. Where we wish to produce gymnastics of the bowel, I would recommend the use of hot air. In this way we stimulate not only the colon, but also the entire abdominal viscera.

XI. NEPHROLITHIASIS.

BY A. H. CORDIER, M. D.,
KANSAS CITY, MO.

A surgical disease that attacks a life-essential organ should receive most careful attention—a stone in the kidney being no exception to this rule. In nephrolithiasis the all-important question of early diagnosis is of paramount interest, as upon an early diagnosis and timely surgery depends the relief of existing lesions and symptoms, and the prevention of irreparable damage to the organ affected. A diagnosis of a stone's presence in the kidney should not receive only a passing thought, with the too frequent advice to drink Lithia water and wait for development. While I have much faith in the utility of X-rays in locating some forms of stone in the kidney, especially if that stone is a large one, I am sure that to place too much reliance on the negative findings by the rays will be to make many mistakes in diagnosis, and thus prevent many patients from submitting to operative procedures for the relief of existing but undetected stones. Positive findings are valuable, yet negative discoveries are not conclusive. I am thoroughly convinced that many cases presenting obscure septic symptoms extending over a period of months, or probably years, will have this uncertainty cleared up and the symptoms made to disappear by the removal of a stone hidden away in a kidney, or the opening or free drainage of a small cortical focus of infection. One of the conditions simulating the presence of a stone in the kidney is a movable kidney, with a long pedicle, permitting the ureter to become acutely bent.

A lady, twenty-six years of age, the mother of two children, gave the history of repeated severe pains in right side near the normal location of the kidney; the pains were so severe that large doses of morphine were necessary to relieve her, the pain usually lasting for thirty-six hours, leaving very much tenderness and uneasiness, lasting for a week. It was noticed at each attack that there was a swelling the size of the fist in the upper costo-iliac space, the same being quite tender; with the subsidence of the pain, this enlargement disappeared. The pain during the acute attack was that of a stone, to all appearance, in its severity, duration, and location. The enlargement, it was plain to be seen, was the right kidney distended with urine.

On examining her during the interval of attack, I found a free mobility of kidney. Operation revealed the true pathology—the kidney was freely movable, dilated as a result of urinary retention, the ureter was found bound down at a point that produced a complete closure when the kidney descended. To make doubly sure of my diagnosis, the kidney was incised, and carefully explored for stone—but none found—opening in organ closed, and the kidney replaced and fixed. It is now one year since the operation, and she has remained free from all painful symptoms, and is in perfect health.

In many cases the diagnosis of renal calculi is easy, while in other cases the symptoms are so obscure that it is impossible to say that a calculus does or does not exist.

Where the patient has had recurring attacks of severe pain in region of kidney, passing down the ureter, with retraction of testicle on that side, with presence of blood in urine, absence of tenderness or other symptoms of an acute inflammatory trouble, one may be quite safe in saying that a stone exists.

All cases of nephrolithiasis do not present these typical symptoms — far from it! The largest stone I have ever removed from the kidney (weighing three ounces) had never produced any severe suffering—only a sense of uneasiness on the affected side, with an abundance of pus in the urine, with the presence of enlargement, which led to the exploration that discovered the stone. The kidney in this case was saved, but the woman had a urinary fistula for a long time.

Some cases will present only a vague sense of uneasiness in the region of the kidney, and consult the surgeon principally for the relief of a painful and persistent cystitis; and

two or three of my cases have had bladder washings of boracic acid, etc., etc., for months before consulting me. The cystitis has subsided on the removal of the stone, and with it the curing of the pyonephrosis. Every case of chronic purulent cystitis resisting the usual curative treatment, faithfully tried, should lead to the most careful investigation of the condition of one or both kidneys. Blood in the urine as a symptom of calculi is of much diagnostic value, especially if vesical calculi and vascular growths of the bladder are excluded, which can easily be determined, especially in the female; ureteral catheterization under direct cystoscopy in the female will determine the source of the blood, while the ingenious "segregator" of Dr. Harris will aid in eliciting the same facts in the male. A large phosphatic stone will not be as likely to produce a hemorrhage or severe pain as a small mulberry calculus with its characteristic angularization.

A small stone studded with sharp projections, if free to change its position in the pelvis of the kidney, will produce frequent attacks of pain, the severity and duration depending on the snugness of its impact and the completeness with which it blocks the ureter. A loose stone will likely be accompanied by an increase of the hematuria on exercise or riding over rough roads. If two or more stones are wedged into the pelvis or calices, and are so situated that the urine may continue to escape naturally unobstructed, an absence of severe pain will be a feature of the case. A stone so situated will in all probability continue to increase in size. Pain and presence of blood in the urine are the two most frequent symptoms present in this disease. The pain is usually, in the beginning, in the region of kidney affected, yet it may extend to either side. This pain varies in intensity from a mere uneasiness to the most excruciating and unendurable agony. The pain may change its position in the progress of case, depending in a measure on site of the stone; for instance, if the stone passes through the ureter as it descends, the filaments of anastomosis between the nerves supplying the ureter and the genito-crural may produce a retraction of testicle on that side, owing to the irritation of the nerve supply to cremaster muscle, the same being true of the fila-

ments supplying the bladder, thus causing that organ to become irritable through sympathy. In females the pain may be referred to the labium, or at the urethral entrance.

In examining a patient in whom a kidney calculus is suspected, every diagnostic resource should be brought to bear in the case. In a patient with a long history of the presence of pus and blood in the urine, following attacks of pain years ago, and the presence of an enlargement in region of kidney is detected, a safe diagnosis in such a case would be nephrolithiasis and pyelonephrosis.

Stones have been removed from the kidney that were so large that they could be felt through the thinned parietes. I have never been able to detect the presence of stones by the grating or rubbing of same together during my examination. The ingenious method of Kelly—that is the introduction of a ureteral catheter, the point of which being curved by wax to receive an impression by contact with a stone—while very unique and artful, certainly has a very limited field of utility and will rarely be resorted to by the diagnostician.

Malignant diseases of the kidney are rare after early childhood, sarcoma being the disease most frequently found at that period. The carcinomatous growths appearing later in life have traits almost peculiar to themselves; hence, can usually readily be eliminated or confirmed in suspected cases. Malarial hemoglobinuria may mislead, but the history of malarial attacks, and the use of the microscope, will show an absence of corpuscles in malarial disease. In making a diagnosis of any disease the symptoms of which are produced by mechanical causes, it is only necessary to apply the usual laws of mechanics as modified by the locality affected, a closely gotten clinical history being essential to this analysis. Uric acid, I believe, forms the nucleus for most stones, yet on casual examination, oxalate of lime calculi appear to predominate; this is due to the fact that while uric acid forms the base of the stone the oxalate and phosphate of lime are deposited like layers of an onion about the uric acid nucleus. Where there is much suppuration, the phosphates may be so abundant that the pus, urine and phosphates make a thin paste. "In about one in five, stones are found in both kidneys," says one author. I believe this is

too high, yet with more careful diagnostic efforts, and more frequent explorations, the truth of this statement may yet be verified. It matters not to what chemical class the stones belong, as long as the indications to be met are the same—remove them.

Urate of ammonium in infants, uric acid in adults, oxalate and phosphate of lime after forty, is the way Greig Smith classifies their frequency. The presence of a stone in a kidney or ureter should be looked upon as a source of danger to the life of the patient and as a constant menace to his well-being from a slow sepsis pain, and chronic uremia, with the ultimate destruction of the affected kidney in a large majority of instances.

In Mr. Morris' cases of early nephrolithotomies, thirty-three in number, he had only two urinary fistulæ following, in both of which the kidney was largely incised to remove large stones. In his late operations for calculus pyonephrosis he had fistula following in thirty-seven, five per cent. Can any one doubt the propriety and advisability of early operation in these cases, with facts like these presented?

A small stone may form in the uriniferous tubules and escape through the ureter, giving rise to no trouble; or, if a little larger, may produce the most intense suffering during its passage through the ureter.

Septic micro-organisms may pass through the healthy kidney circulation and escape with the urine without producing an infection of the organ, but let nature's resisting walls be destroyed or weakened, and the most destructive invasion may result. A ball-valve stone occluding the entrance to the ureter may, by its damming up the urine, produce an enormous dilatation of the pelvis of kidney, and even the whole organ, thus leading to atrophic changes, destroying its excreting properties. An argument for early operations, even for small stones, is the extent to which the organ will regain its function after a nephrotomy; yet it is surprising, even in these large sacculated kidneys that on microscopical examinations are wholly destroyed. When we recall the safety with which an early nephrotomy may be performed, the fear of ill results from the operation, either immediate or remote, vanishes. It would be far better to explore a kidney occasionally in

error, than refuse this effort at relief in cases in which the diagnosis was doubted, for it must be remembered that many diseases of the kidney simulating stone are relieved by a nephrotomy. An early operation for the removal of a stone before the secreting structures of the kidney are injured, before the pelvis is denuded of its epithelium and infected with pyogenic or other bacteria, is quickly recovered from; in fact, the kidney being closed without drainage heals as readily and quickly as the over-lying structures.

At the Middlesex Hospital in ten years there were 3,331 *post-mortems* of death from all causes, and in that number there was found that one and one-half per cent. of deaths from all causes was due to the presence of stones in one or both kidneys or ureters.

A small area of infected kidney structure may give rise to well-marked septic symptoms, and yet the presence of bacteria in the urine remain undetected.

Late operations for a calculous pyonephrosis are frequently unsatisfactory because in some there will remain a urinary fistula that persistently refuses to heal, necessitating subsequent operations, either to close the fistula or to remove the kidney. I am thoroughly convinced that in some of my cases of calculous pyonephrosis I have prevented post-operative fistula by carefully and completely curetting the location of the impacted stone as well as the pelvis and other portions of the kidney seemingly diseased at time of operating. The persistent use of drainage tube or gauze packing is responsible for an occasional post-operative urinary fistula. Keep the ureter patulous by either a long sound, ureteral catheter, or by forcing liquids through the ureter, through the lumbar incision—this washes out blood-clots and cheesy *débris*, both often responsible for a ureteral stoppage following an operation on kidney. I have in several of my cases for the first few days following operation, while irrigating the infected kidney, forced the fluid into the bladder, thus showing the patency of the ureter and at same time washing away any foreign bodies disposed to occlude this channel. A precaution necessary to observe in extracting the stone is the avoidance of undue traumatism to the kidney. If pyonephrosis exist, be careful not to destroy any more of the septa than is

absolutely necessary, as these partitions contain blood vessels, and bleed very profusely when injured; besides, they frequently contain much secreting or healthy structure. All obscure cavities or isolated infected foci should be opened at time of operation, the finger being the best instrument to explore with.

At time of operating in one of my cases I was enabled to dislodge an impacted stone in the ureter—the stone was fully two inches from the pelvis of the kidney, yet by carefully manipulating the ureter, the stone was dislodged and forced back into the pelvis and moved through an incision in the convex surface of the kidney. It is always desirable, when it is possible to do so, to incise the kidney from its convex surface, as the organ heals much more readily—and certainly here rather than through the pelvis or ureter proper. The hemorrhage in a healthy incised kidney is easily controlled by the fingers during the operation, and by sutures and pressure after surgery.

The large vessels at the pedicle should be looked for carefully and avoided; a knife thrust down through the cortex, if care is not exercised, may be pushed through into the large vessels, and a dangerous or fatal hemorrhage induced.

If much difficulty is experienced in checking an alarming loss of blood from kidney, it can be most effectively checked by packing around the organ, using much pressure with bandages and sand bags. If the case is one requiring drainage, a good sterilized gauze packed into the organ will usually check the oozing, and at the same time conduct the urine and pus out through the external opening. This packing should not be left in position longer than thirty-six to forty-eight hours, and all subsequent dressings should be done with very little tight packing unless it is desirable to keep the external wound open for some time. Too prolonged use of snug packs will be disposed to favor a permanent fistula. It is useless to caution against the dangers of opening the peritoneum in operating on a case of pyonephrosis, as all are thoroughly aware of that fact and avoid the "sacred sac" in these cases.

If the peritoneum should by accident sustain an injury during the operation, it should at once be repaired most carefully.

CASE 1.—*Nephrolithiasis.*—Mrs. A., age forty-three, July 11, 1898. Twelve years ago this patient had an acute cystitis, the cause of which I was unable to elicit; since that time she has had recurrences of the attacks a number of times. Two years ago she placed herself under my care; at that time she was suffering from a chronic gastritis. Under treatment she improved in health and gained much in weight. One year ago she had an attack of cystitis; the urine showed blood and pus, epithelium, etc. Living at a distance at that time, I was able to see her only occasionally; however her cystitis improved but did not disappear. Two months ago she developed for the first time symptoms pointing to the right kidney; at that time she developed pain in region of kidney, passing pus and blood in urine. An occasional elevation of temperature was also noticed at this time. Pain on pressure over kidney was elicited, and an enlargement of the organ could be made out easily. Ureteral catheterization revealed pus and blood coming from the right kidney, while healthy urine was collected from the left; bladder inflamed, especially around the entrance to right ureter.

Diagnosis: Pyonephrosis, due to presence of stone in kidney; operation revealed correctness of this opinion. Two large stones were removed from pelvis of kidney, and abscess drained through lumbar incision, the wound being packed with gauze. The diagnostic value of ureteral catheterization was nicely demonstrated in this case. The stones were composed of the oxalate and phosphate of lime, as is usually the case in patients after forty years of age. She never had an attack of renal colic, but had often felt an "uneasiness" in right side over kidney. She recovered well.

CASE 2.—*Nephrolithiasis-Abscess Opening into Right Lung.*—Mr. C., age fifty-five. Some ten years ago this man had a severe attack of renal colic (right side), lasting several days. For four or five years he had "uneasiness" and pain in region of right kidney. The pain subsided, and he was fairly comfortable for two years; after that time he again had pain, followed by a chill and fever, the latter lasting several months. He developed a "diaphragmatic" cough during this time (due to the abscess burrowing through diaphragm), and became very much emaciated. One year before I saw him he began expectorating a thin sero-purulent material in large quantities—as much as a pint or more daily; later he developed a sinus in region of right kidney, and fluid was discharging from the same when I first saw him. His urine showed a trace of albumin, was acid in reaction—abundance of pus—three pints of urine being passed daily. Phosphate in large quantities. A probe introduced into sinus passed eight inches

upward, inward and to the left. A diagnosis of nephrolithiasis was made as the primary trouble ten years previous; later an escape of stone from kidney into structures around the organ, thus producing an abscess that subsequently opened into the right lung, and later on the surface of loin. The fluid he had been expectorating was urine and pus from right kidney. Operation revealed an old abscess about the kidney and extensive destruction of the organ. An opening with phosphatic lining extended from abscess through the diaphragm into a bronchus of right lung. A stone, the size of a filbert, was found in the abscess cavity; the same, I believe, that caused his attack of nephritic colic ten years ago. He improved very much for a few months following operation, then the tissues about the wound began to break down and a large surface was destroyed. He died two months after operation.

The sinus into lung at time of operation was curetted carefully, and soon closed with the free drainage in the back to take its place. The urine and pus ceased to flow through lung. This case is interesting. First, that the stone should have remained ten years. Second, that so large an amount of urine and pus should have passed through the lung for so long without causing death. Third, that the pulmonary symptoms should all have disappeared after the operation. A *post-mortem* showed that the liver, kidney and other organs had undergone amyloid degeneration, a fact that I believed to have existed before operating, yet I decided to do all I could for him in the face of unfavorable prognostic truths before me.

CASE 3.—*Nephrolithiasis.*—Mr. K., age twenty-four. This young man one year ago, while *riding*, was taken with a severe pain in right testicle, the pain seeming to originate in the region of right kidney. The pain and the retraction of testicle ceased at end of twenty-four hours, under large doses of morphia. He remained symptomatically well up to four weeks ago, when while riding he had a recurrence of the pain in testicle; but the pain soon left this point and settled down in region of right kidney and along the course of the ureter of that side. No history of bloody urine, and no microscopical examination of the urine had been made. In the last four weeks he has had almost constant pain, and during the last few days his temperature has run about 101° to 103°. His urine is acid; sp. gr. 1030; no albumin; abundance of phosphates; no blood; but few pus cells are present; tenderness over kidney; some enlargement of organ made out on palpation.

Operation at University Hospital, May 9, 1899. Retroperitoneal incision, angular from curved border of twelfth rib

to point near anterior superior spine of ilium. Kidney much enlarged; overlying tissues adhered to organ. Kidney incised on convex border and finger introduced in pelvis of organ, which was much dilated and filled with fetid urine and pus. No bleeding of any consequence, yet the organ bled quite freely, as they always do. Finger explored the cavity carefully for stone, but none was found until I began irrigating, when a small stone was washed out. A probe introduced into the ureter passed down four inches with no difficulty—no stone felt. Kidney was packed with gauze and usual dressing applied. Urine flowed freely from incision. Fever and pain subsided at once. At the end of two days, believing that a stone was yet impacted in the ureter, I introduced a catheter into the pelvis of kidney, and by hydrostatic pressure forced a stone the size of a small mulberry into the bladder. The patient complained of some pain while fluid was forcing the calculus downward. The fluid (boracic acid) filled the bladder at once. He passed the stone at his second urination, and all ureteral obstructive symptoms disappeared. I continued irrigating the pelvis of the kidney, and at the same time forcing the fluid into bladder through ureter daily for a few days. The wound in back was then permitted to heal and his recovery was perfect.

I have in a number of my cases after operating demonstrated the patency or occlusion of the ureter by this method of forcing fluid through the ureter into the bladder, a catheter being introduced into bladder, and the fluid, colored or otherwise withdrawn. If the patient is awake there is absolutely no danger in this procedure, as the amount of pain complained of will guide the operator as to the time to stop, etc.

DISCUSSION.

Dr. J. Wesley Bovée, Washington, D. C.—As has been said, this is a new line of surgery, surgery of the kidney and the ureter. I have very much enjoyed, and been interested in the paper by Dr. Cordier. There have been some points made from which I differ. I have not found a single case in which I was willing to remove calculi in the absence of pus without establishing drainage. I have feared that there might be some infection, and the safest plan surely is to provide proper drainage.

As to the obstruction of the ureter, which is so very common in these cases, it has always seemed to me to be a very necessary part of the operation, to see that the ureter is

patulous throughout, so that there are no kinks in it nor abnormal constrictions. Therefore, I catheterize the ureter from above downward in all my cases.

Thanks to the work of Fenger, Klyster and others, we have had a new line of work opened to us by a little ingenious plastic surgery. These urinary fistulæ follow for a long time after nephrotomy and nephrectomy in nephrolithiasis, because there is a blocked ureter, and usually it is blocked high. It may be blocked low in these cases and keep up a continuous discharge. When blocked high the exudation of urine is constant. The practice I have found is to look as much to the welfare of the ureter as to the kidney, first, by nephrotomy, removing the stone, and drainage, to be followed later by a nephrectomy and an operation on the ureter. I remove the kidney and if necessary I also remove the ureter.

I have noticed that in all these cases of nephrolithiasis, there is a tendency to tubercular or albuminoid disease, and that evidences of either of these are very likely to be present in the urine. Removal of the kidney usually only relieves the patient but does not cure. The ureter must be removed, or, if not at first, it must be brought low down so that it can be readily found. A large number of kidney diseases have killed the patient, after a nephrectomy, because of leaving the ureter, and yet the operation of ureterectomy is only of limited practice. I believe that there are only 17 of these cases reported, either partial or complete, primary or secondary.

As to the diagnosis of them, we are greatly indebted to Dr. Harris for his ingenious instrument for collecting the urine from both sides separately. But I think too much stress is laid on the condition of angeio-neurotic hematuria. It is so rare as not to control our decision as to what to do.

XII. SURGICAL TOLERANCE AND RESULTS.

BY. F. F. BRYAN, M. D.,
GEORGETOWN, KY.

Every operator is faced with the responsible inquiry, self-propounded, and asked by the interested parties, as to whether the operation will be borne, and if a cure will then result. Of course, this can never be answered with the affirmativeness that would be entirely satisfying to the patient's family. It can, however, with reasonable truthfulness be said that tolerance is unlimited in a properly selected class of cases, provided we avail ourselves of all the adjuvants of good technique and surgical requisites. On the other hand, tolerance is almost *nil* in a badly selected class with an absence of the ordinary essentials. Again, certain organs and structures manifest a difference in their degree and character of tolerance, due to circulation, enervation, and function. The excretory function, being the most important to the surgeon, is, as might be judged beforehand, the one of least tolerance when interfered with by the surgeon. Results, considering that tolerance has been attained, are on the whole disappointing. There are causes for this that if properly appreciated and utilized will, in a great measure, change this statement. These may be included under three heads:

First, the immediate environments of the patient; second, the thoroughness of the operation; third, the time demanded by the operator for after-treatment and convalescence. The class of cases, then, in which an operation is to be performed should be carefully selected, and no indiscriminate routine of operating upon any and every sufferer who presents himself, willing to endure anything in his hopeless effort to receive a hoped-for cure.

What are properly selected cases? Those in whom brain, vascular system, lungs, and kidneys show no incurable disease nor such functional disorders as to make it a reasonable certainty that tolerance would be limited, and that, if tolerance is satisfactory, results will be disappointing. I am accustomed

to operate upon patients with a view to tolerance from these standpoints:

1. Is the patient of sound mind?

2. Is he normally not a neurotic?

3. Has he emphysema, chronic bronchitis, or pulmonary tuberculosis?

4. Has he an uncompensated heart lesion, and more important, is there arterio-venous sclerosis?

5. Is there diabetes mellitus, and do the kidneys show an absence of advanced degeneration? Can they be put in condition of efficiency as opposed to renal inefficiency?

This means specific gravity and twenty-four hours' quantity bear a proper relation to vital uses. Modern technique has done away with the necessity of prolonged preparation in most cases, but not in those of renal insufficiency; not in the profoundly anemic, except under obvious conditions of cause and effect. Next, acute inflammatory states, except where pus has formed, give relatively less tolerance than what is to be obtained in chronic inflammations. Tolerance bears a direct relation to the duration of the operative procedure and the length of time the patient is under anesthesia, and to the amount of blood lost, and as to whether the patient is allowed to be chilled during the operation, and thereby the eliminative function of the skin seriously interfered with.

Capital operation following trauma shows less tolerance than that for surgical diseases, owing to septic infection and hemorrhage having an opportunity to complicate matters prior to the surgeon being called. The intestines rebel more than other organs or viscera ordinarily subjected to surgical treatment.

The pelvis and lower abdomen contain the organs that best tolerate operation. The opening up of large connective tissue plains is undesirable, as in spite of the best technique toxalbumins form, and there is lack of local and constitutional tolerance out of proportion to the importance of the work done.

Drainage is our greatest reliance under these conditions. Patients with mental instability do not, as a rule, bear operations so well as the strong-minded. Neurotics bear trivial procedures well enough, but succumb readily to serious

operations. If operators fail to obtain such results as they had hoped for, and as a rule they do, then these patients live to haunt the doctor's office. Patients with emphysema and chronic bronchitis will, of course, be run down from every standpoint, and senile changes out of proportion to their real age will have occurred, and too often be accompanied by heart and renal insufficiency, to at least some extent, and so make highly unsatisfactory cases to tolerate serious operations. The later stages of pulmonary tuberculosis are known to be highly intolerant, but in its earlier stages it should not prohibit an attempt to give relief to a complicating surgical affection, as by such relief the tuberculosis may be more slowly progressive. Tuberculosis elsewhere, when it is feasible to attack it surgically, is not only tolerant but in my experience is, in many cases, the only method of cure we have to offer.

Enough has been said as to when to expect tolerance, and how to select cases, and what adjuncts are to be utilized to obtain it in the less favorable subjects. Results next in turn face us, and in many instances where the tolerance has been satisfactory the results are not favorable. Results are proverbially known to be very discouraging in a certain class of cases, as epilepsy, neuralgias, paraplegia, and functional disorders, not only of the cerebro-spinal system, but functional derangements generally. This we should expect, as our art deals more with tangible mechanical changes and intelligent pathologic conditions than the evanescent and philosophical conditions due to neuroses. Accuracy of diagnosis will then, of course, be very important and error of diagnosis entail greater disaster and mortification than in medical cases. Insanity, partial or no relief, and death are the results that we have to face with and for our patients. Startling foes! Is it not a wonder that we do not dread them even more than we do? We constantly hear of kitchen surgery, both major and minor. Nothing is more delusive. It encourages the novice, who will be emboldened by a success to bring future regret and disaster. Every safeguard should be demanded for the patient's welfare and the surgeon's comfort and after peace of mind. I would not suggest that in isolated cases, where these surroundings are impossible, the unfortunate

sufferer should be abandoned to his fate, but even here to do what can be done to place the patient under the plainest and most hygienic environments.

Where it is other than an emergency that prevents simple but systematic preparation, refuse to operate without a competent nurse, an experienced anesthetist, and a first assistant. Have room and patient in proper order, and see that this is maintained through your attendance on the case. Don't operate for another physician, and permit him to entirely carry out the after-treatment. Do the work thoroughly, but expeditiously. Observe carefully if something more than was apparent may be discovered when the operation is in progress; if so, do all that is needed while at work; inspect closely as you proceed step by step, and do not rely on preconceived methods and conclusions. There is a decided tendency to get the patient up, owing to the delusion that the patient is all right when around again. Three to six weeks should be demanded for the patient to remain in bed, and he and his friends should be notified before operation that he needs to be placed under conditions of a convalescent from six to twelve months afterward if he has undergone a serious surgical procedure.

Insanity is more liable to occur in females subjected to operation than in males, and more liable in females when pregnant. Next most frequent are operations on the generative organs. The brain will tolerate operative procedures contrary to what would be natural to suppose, with slight tendency to insanity. Hemorrhage, shock, and sepsis are the main things to apprehend that would produce untoward results in brain surgery and injuries; this being borne in mind, the way to remedy them is at once to hand. The eye is especially tolerant, even surprisingly so—so much so that I would advise more frequent efforts in this field—only beware of the ciliary body, for here is danger; it is treacherous beyond description. The eye has a vast phagocytic power, so with reasonable care we need not fear sepsis. Hemorrhage is unusual, and is readily controlled should it occur. The drawbacks are curtailment of function if disaster occurs, and the blemish caused by the absence of perfection of this organ of special sense. Mastoid and tympanic operations need give

rise to no alarm, for with due care the cranial cavity will not be entered, consequently the patient is not put in jeopardy. If such an accident occurs, two dangers are to be faced: hemorrhage and sepsis, the latter being vastly the more formidable if we are dealing with a pus case.

In nasal operations, hemorrhage and opening into accessory cavities are only to be feared; however, no ultimate evil is likely to result. In bone surgery the tolerance is not to be feared, but results vary in different portions of the body, and the time element required before the case can be dismissed is to be borne in mind; on the whole, however, they are ultimately satisfactory. The joints offer a field for work in which the tolerance and results are encouraging in cases operated prior to prolonged suppuration with disorganization and sinus formation, especially if compared with what is inevitable in these cases if left to their course. Chest surgery, viewed from the standpoint of this paper, offers but little, except that pus should always be evacuated from its cavity, necrosed bone removed from its walls, and malignant growths excised if the involvement is superficial.

Tolerance in the abdomen is well known to vary in the hands of different operators and as to the different viscera and organs. On the whole, it may be said that in the pelvis tolerance is very great, but this is compensated for by the partial results. In intestinal surgery, on the other hand, tolerance is limited, but results in the cases that recover are more satisfactory. The spleen and pancreas neither give encouraging returns of tolerance nor results. The liver and gall ducts offer more encouragement in both respects, especially the biliary apparatus, where much of our most brilliant and satisfactory achievements have been obtained. The kidneys and urinary passages are treacherous in their degree of tolerance, and in many instances in the results. In obstructions and pus cases, however, the rule of action to operate is more than justified by the tolerance and the extent of relief resulting. In deformities, paralytic, developmental, or traumatic, we have nothing to dread from deficient toleration, but the mechanical skill and anatomic knowledge that one should possess in this class of work is only partially able to overcome the conditions presented; for we can only remove

excess or borrow to make up for deficiency or remove undeveloped parts that are producing present discomfort or tending to future degeneration. Chronic diseases appear to promote tolerance by increasing general immunity, except in vascular, renal, and tubercular troubles. This is so in chronic suppurative states as compared with acute suppuration, and is, in part, due to the fact that the micro-organisms are dead or weakened, and systemic immunity through phagocytosis has been developed. The youngest babe, the oldest man or woman, or the pregnant woman, may be subjected to operation. Severe hemorrhage will place a patient in great danger, both from the anesthesia and the operation, this with reference to both tolerance and results.

I then conclude that tolerance is due, first, to individuality of the subject; second, to the vital resistance furnished by organs capable of performing their functions; third, by the immediate necessity for the aid of the part operated upon by the body as a whole in carrying on life; fourth, preventing or limiting shock; fifth, limiting hemorrhage; sixth, preventing or limiting sepsis and removing same. Results will depend on, first, by refusing operation to a hopeless class of patients; second, by painstaking care to make the procedure thorough; third, by demanding sufficient time for thorough convalescence and adaptation of the patient to the changes that have been wrought.

XIII. AN ARM SAVED AFTER BEING RUN OVER AND CRUSHED BY A RAILWAY LOCOMOTIVE.

BY S. L. KILMER, M. D.,
SOUTH BEND, IND.

By way of introduction, permit me to say that the following case is not reported in consequence of its being in any sense new or remarkable, or as indicating any unusual skill, but because it shows what can be done by care and patience

in cases that may at times seem almost hopeless in the matter of saving useful and serviceable limbs. Much is thus added to the comfort and happiness of the individual and his usefulness to the public, and reflects credit upon the medical profession. It is, of course, always much easier and simpler to perform an amputation of a severely injured limb than to save it, and the surgeon is much sooner through with his patient, but the patient is not so fortunate in being through with his affliction when thus maimed for life; for, unfortunately, when a limb is once removed by the surgeon, it remains off forever, and no other comes to take its place, and I contend, much as we esteem the ability of rapid and skillful, as well as successful amputations, and operations generally, such ability is not so powerful an argument in favor of the general qualifications of a surgeon as will be demonstrated by saving, in a useful condition, a limb so seriously crushed as to appear hopeless.

I admit that it requires greater knowledge and more self-assurance to decide in favor of attempting to save a mangled limb than is required for its removal by amputation; but it is the surgeon's duty to be possessed of judgment and discretion, indicating when to withhold his hand, as much as it is his duty to perform operations skillfully and dexterously. If the surgeon will put himself in his patient's place, and then consider what he would wish to have done in his own case—simply observe the Golden Rule—he will not make frequent errors in this respect.

I am aware of the fact that some will say, a stump is better than a deformed and useless member, and to this I assent, but not all deformed members are useless, nor are all useless members deformed, and the question of serviceableness depends upon their usefulness, and not on their perfection of form or deformity. The mere fact that at some time a surgeon has succeeded in saving a limb or extremity which afterward proved useless to its possessor should not cause him afterward, when in doubt, always to amputate, for I boldly assert, but without, of course, the opportunity of demonstration, that for every case of a useless member saved by conservative surgery a score or more have been amputated which might, by proper care and attention, have

been saved, to the great and lasting benefit of the possessor. The ease with which an amputation can be performed, the effect it has upon an unthinking public as an indication of skill on the part of the operator, tends to enhance his reputation; the flattering reports in many, if not most, localities, by the daily press, conduce to operating and amputating without discretion, consideration or discrimination. Thus, in time, there is a hardening of heart, and an involuntary amputating instinct formed by the surgeon to such an extent that all that comes to his mill is amputating grist, and he runs in a single narrow channel or rut, which causes him to overlook entirely the grandest portion of his duties, viz.: not only to preserve life, but to so preserve the life and functions of an individual as to make him the most useful to himself, his family and the public.

The title of this article may be thoughtlessly considered as a misnomer, the forearm being crushed, but the crushing was practically of the *entire* forearm, and when we consider the usual rule to always cut wide of the injured tissue in railway injuries, we will see that, to follow this rule of amputation in a case of this kind, we would necessarily sacrifice the entire arm. It will be observed that the general tone of this article is a plea in favor of conservatism. Now to the case in question:

About three o'clock in the morning, October 26, 1897, I was called to attend Mr. George Blue, American, age 27, height 5 feet 6 inches, weight 130 pounds, a yard switchman in the employ of the Lake Shore & Michigan Southern Railway, at South Bend, Ind., who, in turning to step from the footboard of the engine, slipped on the frost and fell in front of the engine, which at that moment started, the engineer and fireman not having observed the fall of Mr. Blue. The engine, in running over him, dragged him for some distance. Perhaps he caught hold of some part of the engine to protect himself, but in any event he was dragged over the ties for some thirty or forty feet. His left forearm lay across the rail, and one or more of the wheels of the engine ran squarely over it, crushing the bones into short lengths and fragments, and mangling and crushing the soft tissues in the usual frightful manner in such cases. There was also a scalp wound of some four inches in length, extending to the skull. After a primary examination

he was removed to the Epworth Hospital; there, assisted by Dr. C. Stoltz, I made a more careful examination of his arm, and found the above description not in the least exaggerated. My first impulse was, of course, to amputate the arm above the elbow, as being the proper course to pursue in consequence of the terribly mangled condition of the entire forearm. However, I remembered having read, not long prior, the results of a German surgeon, who endeavored to avoid amputations in all cases where it was possible to do so, leaving, practically speaking, amputations to nature, under the opinion that nature was more conservative than art as practiced by the surgeon, and a better judge of the actual requirements than he. His method was simply to assist nature when it was evident that she was performing an amputation, thus ascertaining whether it were not possible to save many cases which under the usual practice had been sacrificed, and his success had been so marvelous as to even astonish himself, saving many limbs that appeared hopeless, and of many others saving a generous portion of the limb, to the great benefit of the patient.

Having myself always been given to the practice of conservative surgery, although on a smaller scale, by means of which I had been enabled to save many entirely useful members, even without loss of motion in the joints which had been opened by the accident, or in the operation, I was the more easily inclined to believe that it would be perhaps justifiable to make the effort to save the arm in this case, despite its almost hopeless outlook. The arteries had fortunately escaped severing, as indicated by their continued pulsation, but it was feared the injury might cause them to slough and bring on secondary hemorrhage.

The decision being made, I enlarged by incision one of the openings from which protruded bones and mangled flesh sufficiently to enable me to examine carefully with the fingers the entire interior, and removed with scissors a large amount of comminuted soft tissue. There was also removed one section of the radius, two and three-fourths inches in length, which was entirely free from the soft tissues, together with a number of fragments of bone of various sizes; a portion of the ulna, two and one-quarter inches in length, being still attached to some of the soft tissues, was permitted to remain, with the hope that it might perhaps receive a sufficient amount of nourishment to protect its vitality.

After having thoroughly irrigated the vast cavity within the forearm, and trimmed off everything that was beyond the possibility of reparative process, drainage was provided for, and the fragments of bone replaced in as natural a posi-

tion as possible. The arm was extended and laid upon a straight posterior board splint, extending from the axilla beyond the finger tips, carefully packed in a gauze dressing, and light bandages applied. Strict asepsis was of course out of the question in this case, but the general principles of antiseptic treatment were complied with as closely as possible under the circumstances.

The next day the temperature was 101°, and, as was to be expected, there was a great deal of tumefaction, the swelling extending well up to the axilla, the skin over the forearm and extending some distance above the elbow much discolored, almost black. On the following day the conditions were worse, and I began to fear that a great error had been made in the attempt to save the arm. However, the condition remained, practically speaking, stationary for several days, and then began a profuse purulent discharge. There were large formations of pus at various places between the elbow and wrist; in fact, there was a general suppurating condition of the entire forearm, necessitating the free use of the knife, so that the whole forearm resembled a sieve or bag, and upon irrigating with some little force, the fluid would discharge from half a dozen different openings.

After a few weeks a splint was constructed, composed of longitudinal iron bars, curved so as to allow free access to the openings in the forearm, and at the ends of the bars leather straps and buckles, by which the splint was held in position; the bones being again arranged as correctly as possible and free drainage provided for. The limb could thus be handled and dressed without removal of the splint. The discharge was very free for a period of probably two months, necessitating a change of dressing twice a day. Eventually, however, the swelling subsided greatly, the discharge diminished, and the general appearance of the arm improved. About this time he left the hospital for his home, coming to my office every day or two for treatment for several months longer. There was still a considerable discharge, and it was evident there was some necrosed bone remaining, and on the 9th of May, 1898, again assisted by Dr. Stoltz, I made an opening on the anterior or palmar surface of the forearm, near the wrist, and the portion of the ulna referred to above as being left in the hope that it would survive, the entire diameter of the shaft of the ulna, two and one-quarter inches in length, was easily removed, being found lying in a cavity of its own, entirely freed from all other tissues and entirely dead. The periosteum had unfortunately failed to produce new bone, as was hoped, and apparently the contraction of the muscles had crowded the

portion of necrosed ulna out of position, approximating the extremities of the fragments of the bones, between which there was a ligamentous union only. The wound was closed and speedily healed.

The result is quite satisfactory, as the arm is quite useful, the patient having considerable power of flexion of the thumb and all of the fingers, which enables him to hold a book or other object in his hand very comfortably; the ligamentous union, although quite short, unfortunately still permits the hand to droop, so that the arm becomes decidedly curved. This can, however, be corrected by wearing a splint for a few days, which serves to correct the position of the bones, or did until some months since. There is however, now a contraction of the muscles, slipping the extremities of the bones over each other, and a shortening of about three inches. The arm is entirely well at this time; that is to say, it is entirely healed and is painless. The ligamentous union and the natural weakness incident to the terrible injury to the soft tissues, makes it of course a very imperfect arm, but it is in a very much better condition, and much more serviceable than would have been any artificial arm that could have been put on the stump, had it been amputated.

An important matter for consideration in this case is the question of the advisability of freshening up the extremities of the bones, and wiring them together in the hope of procuring bony union; such result would doubtless add very much to the serviceableness of the arm, but should the effort result in failure, it is believed that it would interfere to a certain extent with its present usefulness.

The result is, indeed, very gratifying, and demonstrates the justice of the attempt to save the arm, and I can not refrain from the belief that very many limbs that are ordinarily sacrificed might be saved, and made more serviceable to their possessors, by pursuing the course indicated above. It of course takes a long time and a great deal of service, and very much worry also, to produce a result of this character in a case of this description, and perhaps in some cases attempts might be made that would eventually prove to have been ill advised, and in which amputation might become necessary. Still, the results in this case have been so favorable, and my previous results from the practice of conservative surgery have also been so satisfactory, that I

feel not only justified in continuing along the same lines, but would feel that in many cases it would be reprehensible not to make the effort to save very seriously crushed members.

I am, of course, not to be understood as advocating the attempt to save all limbs that are crushed. There are many of them that it would be the greatest folly to make such an attempt upon, but if the result herein described can be produced in an arm crushed between the wheel of a railway locomotive, and the solid T-rail beneath it, it is reasonable to assume that favorable results may be produced in a goodly number of injured limbs that are ordinarily amputated because of a belief that it would be impossible to save them.

I know of no definite rule by which the surgeon's practice in this respect should be guided; much indeed must depend upon the wisdom and judgment of the surgeon; but basing my opinion on the conditions and results in the case reported herein, I should say that whenever the arteries are left intact, providing a blood supply to the parts beyond the injury, it would be justifiable to make an effort to save the limb, however much the bones and soft tissues are crushed, especially so, if the condition of the periosteum is such as to warrant the belief in its vitality and ability to restore new bone. The severed extremities of the muscles can sometimes be held in apposition by sutures. The loose fragments of bone may be removed, the remainder put into the best possible apposition, the limb thoroughly cleansed, laid in as natural a position as possible, kept clean and warm, and some dependence placed in nature, and she will produce results which will frequently astonish the surgeon by the way in which his art is excelled.

I have not mentioned the nerves, for the reason that their fibrous character generally protects them from laceration in doubtful cases, and even if a nerve is severed, it is entirely practicable to unite the severed extremities by sutures with anticipation of favorable and satisfactory results.

Lest there should be some doubting Thomas, who would consider it impossible that a railway locomotive could thus pass squarely over an arm without crushing it beyond the power of nature, with the surgeon's assistance, to repair, and who would think, therefore, that an error had been made in

the case here reported, pardon me for alluding to another case that occurred in my practice a few years ago.

April 21, 1897, Mr. E. P., height six feet, weight 170 pounds, 28 years old, an employe of the same railway company, while blocking a car that had no brake, was caught by the slipping of the stone used for blocking; the wheel caught his fingers, ran over them, and his hand and forearm to the elbow, and yet did not break a single bone. The force was so great and the shock so sudden that it caused him to turn a somersault. There was a violent wrench or sprain of the elbow joint, and also of the shoulder, but as above stated, not a bone was broken, not even in his hand or fingers, although the soft tissues were badly swollen and discolored for some time.

This is, however, an exceptional case, occurring, no doubt, in an exceptional individual; exceptional, that is to say, from the standpoint of good fortune, as he has at another time since then, July 13, 1899, again miraculously escaped serious or fatal injury, having been caught between the draw bars of two cars, but instead of being cut in two, as is usual in such cases, he was apparently forcibly squeezed and rotated out of the very jaws of death, and although laid up for several weeks from his injuries, he has now entirely recovered, and is nearly as well as ever.

DISCUSSION.

Dr. George W. Crile, of Cleveland, O.—The essayist is to be congratulated in securing such an excellent result, but I feel that the doctor underestimates the position taken by many surgeons upon this question of saving mangled limbs. I only wish to say that I treat these injuries very much as the doctor has described, and, if possible, try to save them. I would not like the impression to go out that surgeons are so lax in this regard, and that they amputate in nearly every case.

Dr. H. H. Grant, of Louisville, Ky.—The essayist has very well elaborated the question of conservatism as applied to severe and crushing injuries, and most of his conclusions are correct up to a certain point. In extremely lacerated injuries, such as presented in this case, the question with the surgeon is whether the patient would be better off with the limb amputated and an artificial limb applied. This question can be answered in the negative with respect to the forearm, or an upper limb, and such injuries treated upon the expectant plan up to the period of safety is a wise course to

pursue. With respect to the danger of blood infection, it is exceedingly great. No surgeon can afford to undertake to save one patient at the risk of great danger, thus setting an example for a great many others who may sustain a similar injury. If the injury is severe, and there is an immense amount of pus, with long-continued necrosis of the tissues and bones, as described by the essayist in the history of his case, many a patient will perish who would have been saved by early amputation. It is a wise plan in cases which do not involve great damage to joints of the upper extremities to treat them upon the expectant plan, but in those in which the injury is severe, whether it be in the upper or lower extremity, we should waste very little time by the expectant plan of treatment, but resort to early amputation unless a favorable outcome is to be expected. In cases of injury to the soft tissues in the lower extremity, or where the joints of the lower extremity are involved, I believe amputation will be found to be the best course to pursue. In injuries of the ankle joint disastrous results will follow in the majority of cases, where infection has taken place at the time of the injury, unless operated on. Better results will be obtained by immediate amputation than by the expectant plan of treatment. In the upper extremity, where a joint is not involved, it is permissible to watch the progress of the case in the hope of retaining as much usefulness of the limb as in the case presented in this paper.

The doctor is to be congratulated upon his result, but if his example were followed by other surgeons in regions of the body where important joints are involved disastrous results would very likely ensue. The results, even if favorable, are far less satisfactory than those that can be obtained by the various methods of prosthesis which are employed by all the manufacturers of artificial limbs.

DR. KILMER (closing the discussion).—Some doubt may be entertained as to whether the car-wheel really ran over this man's arm. I felt myself that there was some uncertainty about it, but on inquiry I found that it was true. When a limb is so badly mangled as to be beyond the possibility of the reparative process, it is a waste of time to endeavor to save it; but an effort should be made to save a great many limbs, even though it may be necessary to do an amputation afterwards.

XIV. THE VALUE OF PROSTATIC EXAMINATION.

BY J. LELAND BOOGHER, M. D.,
ST. LOUIS, MO.

From the number of cases that have come under my observation during the last few years where prostatic examination had been entirely overlooked by many able physicians, I have been emboldened to present this paper to you, feeling deeply as I do its unlimited importance, not only from a genito-urinary standpoint but the serious general effects resulting from prostatic derangement, symptoms of which are often referred by the patients to other portions of the body. I will attempt to present a few cases of different kinds, having selected cases most prominent in each class.

The prostate as a gland has been written of so thoroughly of late that I will not attempt to go into any description of the gland. I know that in the medical profession in general there is no feeling of *éclat* connected with the prostatic examination. I know the delicacy many refined physicians feel in inserting their finger into the rectum, but as there are many things in medicine that are absolutely essential, notwithstanding the sentimental objections many have at their undertaking, I think a physician should never consider for a moment his own repugnance where an examination of the prostate is necessary.

Mr. J. G. C., aged 48, a man of large business responsibilities, was sent to me by a masseur, from whom he had been taking a course of massage in the hope of relieving an excessive case of lumbago from which he had been suffering for some time past. Having applied to a number of physicians for relief, and having received none, he had about given up the effort. He was in the best of health in appearance, and the only complaints he made were of the great pain in his back and a great mental apathy that had been coming over him, as he expressed it, for two or three years, and which had grown so bad that he was not able to attend to his business for more than one or two hours consecutively without becoming very heavy and dull, and that he would sometimes go to sleep sitting at his desk; that he took no further inter-

est in pleasure of any kind, and that his memory had begun to fail him. I learned that he had married the second time, about five years previously, eight years after his first wife's death, a young woman twenty years his junior, and his mental apathy had been gradually coming on for the last three years, as had also the pain in the back. Coitus was performed at long intervals with much effort and no pleasure, and the next day he would suffer more severely with his back. He was urinating three or four times during each night. He had never suffered from urethral infection.

Examination of his prostate showed a large gland, hard to the touch, and massage produced no discharge at the meatus. At the end of a week, by simply treating his prostate, he was much relieved, and at the end of six weeks he had no pain in his back and did not get up at night to urinate. Mentally he was remarkably improved, and at the end of three months he was able to attend to business as well as he ever could and was performing coitus with pleasure. His desire had returned and his back was well and strong.

Mr. J. C. C., aged 63, married, a merchant, applied to me, fearing he had kidney trouble because he had to urinate so frequently, especially at night. Examinations of specimens of urine revealed nothing abnormal, but an examination of his prostate showed a large, firm gland which, on massage, gave him pain at the end of penis, but produced no drop at the meatus. He had had pain in his back off and on, but not so severe but that he could stand it, had never had an infection of the urethra and had long since given up coitus. Treatment of the prostate in two months relieved his frequent urination, strengthened his back and caused his desire for coitus to return, which, at last accounts he was continuing to enjoy and was feeling strong mentally and physically.

Mr. J. S. G., aged 53 years, single, a retired merchant, applied for relief for a bladder affection from which he had suffered for some years, having been unable to retain his urine for any length of time, and it gave him much pain to stop and start the flow. On questioning him, I learned that he had suffered several times in earlier life from gonorrhea, and often it was several months before the acute symptoms would subside, and that he always had a weak back. On examination of his prostate I found it large and mushy to the touch, and on massage there was quite a discharge of thick, white secretion filled with many plugs of whiter material which, on examination, showed a mixed infection. During the examination the patient fainted, which in severe cases is often the result. On asking him whether sounds had ever been passed, he answered, as they usually do, that

they had often been used, and that they had been given him to use on himself, which he had often done.

After treating his prostate, and later on his anterior urethra, he was entirely well at the end of five months, and all this without the use of sounds. He is now like a new man, and contemplates matrimony, whereas previously an erection was a horror to him.

Mr. A. L. T., aged 31 years, married, a fireman and ex-professional base ball player, desired relief from gonorrhea, and stated that he was unlucky enough to be always catching this peculiar cold. He had had attacks of rheumatism in his knee and back so much that he had to give up playing ball. Examination of the prostate revealed a large, soggy gland, secretion from which, on examination, showed gonococci in large numbers. The fact was that his prostate had been a constant source of inoculation to his anterior urethra on the glands being subjected to excitation, either from coitus or intoxicants. Sounds had often been used. He was easily cured, and has returned to professional base ball work, which, I learn, he is playing better than ever.

I have had quite a large number of young men apply to me to learn if they were well of gonorrhea, as they wished to get married; and on examination of the prostate and its secretion, in the majority of instances it was revealed that they were still able to transmit gonorrhea. One flagrant case of error made by a prominent genito-urinary surgeon was revealed to me by a patient, Mr. H. W. C., Jr., who applied for relief from prostatic gonorrhea, and in confidence told me that he had been assured by the physician who had treated him three months before that he was entirely well, and that the tripper fadden in his urine amounted to nothing, and he could get married, which he had done, and had inoculated his wife with gonorrhea, and she had transferred it innocently to her eyes. She will be a sufferer possibly for life, because the previous attending physician had failed to examine the husband's prostate and its secretion. I have had some cases of degenerated gonorrhea in married women, where I have had their husbands call, and it has always taken much persuasion on my part, there always being protestations and declarations from them of their never having been infected; yet, nevertheless and notwithstanding, examinations of their prostates would reveal infection. One of these cases is

worth mentioning, the couple having been married several years and never having had children, but since treating him they have had one child, and soon expect another.

In cases of sterility the man's prostate should always be examined, as it is a good rule to believe the trouble generally is with the husband.

The first two cases, from the symptoms complained of, would, I believe, not lead many physicians to examine the prostate, and, in fact, it is exceedingly seldom I ever have a case where there has been previous treatment that there has been prostatic examination made, and I have found that it was always necessary in genito-urinary practice, as well as in surgical and general practice. The fact that there had been no previous infection in these patients, as often occurs, did not obviate the necessity of prostatic examination, and the improved mental vigor of these cases on treatment of the prostate, which is a result often secured, is especially to be noted.

I do not think the profession sufficiently realizes the close relation existing between the prostate and the brain, and how much pathological conditions in the prostate affect the mental integrity and will power of man. I have not had, as yet, a sufficient number of patients beyond the age of fifty-five to make my results valuable, but in the seven men beyond that age, the oldest being eighty-four, that I have treated, there has been a markedly increased mental strength, and I now expect a general improvement in every severe case of prostatic trouble that I am called upon to treat.

The number of cases of supposed lumbago that are cured by treating the prostate has been a surprise to me, as the weak back seems to improve immediately that the prostate improves under treatment, and I believe that, as in the female the pain in the small of the back is often dependent on the uterine versions, so in the male the prostate should be interrogated in all cases of backache. The frequency of urination in patients of various ages where small quantities of urine are passed at a time is also relieved, in the majority of instances, by treating the prostate, and in these conditions should always be examined.

In the severest cases of infected prostates with which I have had to deal there had been previous treatment of the

urethral tract with steel sounds, and it seems to be popular with some physicians to give sounds to patients to pass themselves.

I wish to state that I am diametrically opposed to the use of the sound in the treatment of either gonorrhea or stricture conditions. A sound should never be used to dilate the anterior urethra where such sound will reach the posterior urethra, which portion of the urethra has not been involved and does not need treatment, and therefore should be respected too highly to be invaded uselessly in any way, which in most instances affects the posterior urethra. There is, and can be, no value in the sudden dilatation of the anterior urethra with the sound. The only practical and sensible treatment in the dilatation of the anterior urethra, which, of course, can only be used for opening up the folds of the anterior urethra that have been stuck together by the discharge, is the use of the Kollman-Oberlander dilator, which penetrates only as far as Cowper's gland, and which can be dilated very gradually. It is so shaped that it dilates the urethra in those portions only which most need the dilatation, and does not dilate the meatus, which can not be dilated, and which is always most pressed upon by the use of the sound. I do not think the posterior urethra should ever be dilated.

I know that I will be opposed in the above views—possibly censured and criticised for what I have said regarding the popular steel sound—but I am firmly of the belief that time will show that the objections I have stated above to the sound will prove true.

DISCUSSION.

Dr. Hal C. Wyman, of Detroit, Mich.—I was much pleased with the doctor's paper, and I desire to inquire as to his method of treating the prostate. What does he do for the prostatic troubles that he discovers by examination?

Dr. Boogher.—In answer to the gentleman who asked a question regarding the treatment of prostatic troubles, I will say that my paper was on the value of examination of the prostate. I have a paper in course of preparation on treatment which will be completed shortly; so, of course, I do not wish to speak about treatment until I have finished my paper, which will be published.

XV. THE TREATMENT OF GONORRHEA IN THE FEMALE.

BY A. RAVOGLI, M. D.,
CINCINNATI, OHIO.

Gonorrhea in the female is as interesting a disease as it is in man, as it often causes serious complications, which may expose the life of the woman to grave danger. It is the result of the local infection by the gonococci, which are constantly present in every case. Indeed, I never wish to establish the diagnosis of gonorrhea if I do not find the presence of the cocci. The microscopical examination of the secretion is so easily and so quickly made that I consider it to be a great negligence on the part of a practitioner to speak of gonorrhea without examining the discharge.

On account of the anatomical disposition of the organs in the female, gonorrhea always becomes more complicated, and we must distinguish the affection according to the parts affected. It affects the urinary and the generative organs, and on account of their vicinity, both are often affected. We find a urethritis, cystitis, vulvitis, inflammation of the Bartholinian glands, vaginitis, cervicitis, endocervicitis, endometritis, and, as a consequence, salpingitis, oöphoritis and peritonitis. It would take a long article to review all these affections, which it is impossible to do in the circumscribed limits of this paper. As in man, we have in the woman cases of acute and of chronic gonorrhea.

I will not dwell long on the acute cases, which have symptoms so severe and marked as to compel the woman to seek relief from the medical profession. In these cases an abundant purulent discharge of an offensive odor oozes from the vulva, which with its irritant qualities causes intertrigo of the surrounding skin of the thighs and of the labia, with a burning and itching sensation. The labia minora are red and swollen, and if the Bartholinian glands are affected there is great swelling of the labia majora posteriorly, with pain spreading down to the thighs and to the knees. In these cases the urethra is also affected. The patient can not retain the urine. She has tenesmus, and sometimes also cystitis.

The suffering from acute gonorrhea is such that the woman will remember it for a long time, and will refer to it as one of the most important points of the anamnesis.

In most of the cases we have to do with chronic gonorrhea, which sometimes is the result of an acute attack, while in some other cases it begins as a chronic form, according to the condition of the inflammatory process at the time the virus was inoculated.

Gonorrhea often remains concealed in the female genital organs without producing apparent troublesome symptoms. I have often heard women affected with chronic gonorrhea deny any suffering, complaining only of what they call female trouble—whites—which the medical men term leucorrhea.

Jullien has very excellently described the troubles of a woman affected with chronic gonorrhea. It is not found exclusively in women who have been exposed to the contagium, and is not infrequently found in married women who have been infected by their own husbands, who, at the time of marriage, had still some trace of an old posterior gonorrheal urethritis, which they thought entirely innocent and of no consequence whatever. As the sufferings have begun after the wedding trip, this is looked upon as the origin of all the trouble.

In acute cases, when the discharge is so abundant that it soils every part, it is impossible to distinguish the organs which have been affected and the organs which have been spared. In the subacute or chronic cases, and especially where the infection has been produced by an old latent case of gonorrheal urethritis, we can see the organs affected and establish the exact diagnosis.

I will introduce a few statistical tables taken from my hospital practice from September, 1894, when I took the venereal service, to September, 1899, from which results:

	Acute Gonorrhea.	Chronic Gonorrhea.		
		Urethritis.	Vaginitis.	Cervicitis.
1894	51	8	1	--
1895	117	6	5	2
1896	118	4	3	--
1897	112	2	2	4
1898	50	6	3	1
1899	20	4	3	--

INFLAMMATION OF BARTHOLINIAN GLANDS.

	Acute with Abscess.	Chronic Catarrh of the Excretory Ducts.
1894	0	5
1895	2	7
1896	0	6
1897	1	4
1898	2	6
1899	0	8

SUBACUTE AND CHRONIC GONORRHEA.

	Endocervicitis.	Endometritis.
1894	5	24
1895	10	28
1896	7	30
1897	8	46
1898	12	52
1899	6	16

COMPLICATIONS OF THE UTERINE ADNEXA.

	Pyosalpinx.	Oöphoritis.
1894	--	--
1895	2	--
1896	19	--
1897	20	--
1898	14	--
1899	11	8

The disproportion between the acute cases of gonorrhea in reference to the chronic cases, is due to the gravity of the symptoms in the first, and to the mildness of the same in the second. I must remark also that the large number of cases in the years 1895, '96 and '97 was due to the enforcement of police regulations. In these three years the houses of prostitution were frequently raided, the inmates were taken to the hospital and subjected to examination, and if found diseased they were detained in the institution.

In woman, as in man, nature has placed some obstacles to the progress of the gonococci, so that when a contiguous organ is recently attacked we find it to be a new complication, although it is nothing more than the spreading of the same process.

When the infection originates from a chronic gonorrheal urethritis in the man the organs of the woman which are more exposed to the contagium are the urethra and the cervi-

cal canal of the uterus. Indeed in the generality of these cases we find often a subacute and chronic urethritis combined with endocervicitis. The vagina is seldom affected in adult life, and our statistical table shows only a few cases. The infrequency of gonorrheal vaginitis in adults caused its possibility to be denied, but it was after a while established by the observations of Mandl* and Doederleins, Bumm†, and thoroughly described by Calmann‡ from his observations in the clinics of Dr. R. Asch.

An acute vulvovaginitis is often found in children, when either by criminal act or by accident they become infected with gonorrheal virus. The resistance of the epithelium of the vagina in the adult I believe to be a great safeguard against the action of the gonococci. Our cases of vaginitis and cervicitis have occurred in very young women, very weak and anemic, and previously affected with leucorrhea. The leucorrhea macerating the epithelium of the vagina has been the cause of preparing the ground for the proliferation of the gonococci, which in the normal condition would probably have found an obstacle to their proliferation in the resistance of the epithelium of the vagina and of the cervix.

The organ which comes in contact with the meatus of the male urethra in the act of coitus, is the cervical ostium. It is furnished with a thin and delicate cylindric vibratile epithelium and the gonococcus finds there a good ground for its development. When the cervical canal is so affected, although it is an integral part of the uterus, yet we have not a true endometritis. The os uteri internum, which divides the cavity of the cervix from the cavity of the uterus, is a boundary which prevents the gonococci from proceeding further and infecting the endometrium. It is for this reason we find so many cases of endocervicitis, while endometritis is comparatively rare. When the gonorrheal affection spreads to the body of the uterus in an acute form, then the woman is seized with a chill and fever, general malaise and pain in the abdomen, which is tender and can not bear any contact. An abundant muco-purulent discharge flows from the cervix into the vagina, which soils the linen and inflames and exco-

* Monatsschr. f. Geb. und Gyn., 1897, Heft 1.
† Veit, Handb. d. Gyn., Bd. I, C. 474.
‡ Derm. Zeitschrift, Aug., 1899. Heft 4.

riates the skin. At times the woman suffers irregular hemorrhages, and the menstruation becomes irregular, prolonged and very profuse.

In the chronic gonorrheal endocervicitis, the process which for some time has remained latent in the cervix, spreads to the endometrium without causing acute symptoms. The woman does not perceive any other apparent sign than a kind of moisture of the genitals. Subjective symptoms are coming gradually. The menstruation is preceded and accompanied with pains which before were never present; the period is disturbed, sometimes advancing, at other times retarded. The woman complains of backache, which she attributes to a strain, having lifted a heavy bucket, etc. She feels bearing-down pains in the abdomen, which spread to the internal region of the thighs. Under these complaints the woman loses her appetite, the digestion is impaired, a constant sense of fullness prevents her from eating. In a great many cases constipation increases her troubles, and in others micturition is frequent. The general health begins to suffer; the patient becomes anemic, loses sleep and diminishes in weight. She gradually becomes neurasthenic, is extremely sensitive to all impressions, and everything affects her mentally. Sympathetic pains are felt on one or both sides of the abdomen, showing complications on the part of the tubes and ovaries.

Often a woman in this condition, coming to a physician, does not believe that the condition of the uterus is the real cause of all her sufferings, and refuses an examination. It is therefore our duty to insist upon an examination and ascertain the condition of the womb.

The examination of these chronic cases usually does not reveal much of an alteration of the external organs, with the exception of a light redness of the ostium vaginæ. Introducing the speculum, a scanty mucous discharge is found oozing out of the os uteri, which is sometimes yellow, sometimes whitish, of a crystalline appearance, thick, tenacious and adherent. Washed with a stream of an antiseptic solution, the mucus is removed with difficulty, and can only be taken away by wiping with a piece of dry cotton. Often around the cervix are abrasions and excoriations, which bleed at the slightest touch. The lips of the os tincæ appear

deeply red, excoriated, covered with small granulations and in ectropic condition. I introduce a small tampon of cotton, fastened around a thin uterine sound, into the cervix as far as possible in order to take the mucus off the cervix, and with this I smear glass slides to search for the gonococci.

So far, with all the symptoms which we have found, we can establish only the existence of an endocervicitis, but we are still in the dark about the condition of the endometrium. Chronic gonorrheal endometritis we have reason to suspect already from the persistence of backache, the heavy feeling in the hypogastrium, and on account of the disturbances of the menstrual periods. We will acquire the certainty when, on introducing our finger into the vagina, and pressing down with the other hand on the hypogastrium, we find the uterus very tender to pressure, hard, swollen and increased in size. Although the introduction of the uterine sound would give the exact measure of its cavity, yet it is better to avoid this procedure for diagnostic purposes, because frequently this is the means of spreading the infection from the cervical canal to the endometrium. Gonorrheal infection does not limit itself to the cavity of the uterus, but from it may spread to the tubes, to the ovaries and to the peritoneum, causing dangerous complications, which we refer to gynecological jurisdiction. Gonorrheal infection may also be carried by the circulation to the serous membranes of the body, causing gonorrheal rheumatism, with all its consequences. In four cases of gonorrheal arthritis I could confirm the observations of Finger and others, demonstrating in the pus and in the serum of the joints large quantities of gonococci.

Returning to our subject of treatment, gonorrhea in the female, as in the male, has to be treated in the locality where it has developed. The object of the treatment is to remove promptly and often the secretion from the mucous membranes and destroy the gonococci in the locality.

The first aim is obtained by repeated and prolonged irrigations with antiseptic solutions, the second by applications of remedies capable of causing a superficial necrosis of the epithelium, thereby reaching the gonococci, which enter into the epithelial cells and find their way to the subepithelial layers of the mucous membrane.

In regard to the first method, irrigations are made with solutions of bichloride of mercury, 1 to 5,000, with permanganate of potassium, 1 to 5,000. These irrigations are easily applied to the external genitalia, to the vagina and to the vaginal portion of the cervix. With an ordinary fountain syringe the woman can herself apply the douches with one of these solutions twice a day. These will remove the mucopurulent secretion, will diminish the inflammation, but of course will not help the urethra nor the condition of the uterus. Every two or three days I insert a vivalve speculum, and with a solution of permanganate of potassium, 1 to 5,000, thoroughly irrigate the vagina, then with small tampons of cotton the secretion from the cervix is carefully removed. When abundant discharge is flowing from the cervical canal, I take a Talley or Haynes douche tube, which I insert in the cervix as far as the internal os, and with a mild stream of the same solution the cervical canal is washed. When symptoms of urethritis are present then the uretha is also irrigated with the same permanganate solution. This is done, too, by means of a short recurrent catheter. I do not find it useful to fill up the female bladder as in the male by the Janet method. The sphincter of the bladder in the female offers a great resistance to the passage of the fluid, and a forced injection into the urethra is accompanied by pain. The fluid is carried into the bladder only with difficulty. For this reason I prefer to introduce a recurrent catheter when I have to irrigate the female urethra and the bladder.

Returning to the cavity of the uterus, under ordinary circumstances I seldom use the irrigation, unless the discharge should be very profuse. Ordinarily I use the instillations with a one per cent. solution of protargol, as we will see later on.

To obtain the direct action of any antigonorrheal remedy to act on the gonococci, several medicines have been used. The most effective antigonorrheal remedies so far known are ichthyol and the silver preparations. Ichthyol has a beneficial action, especially in cases of acute gonorrhea in the female, and in my clinics every case of acute vaginitis and vulvitis easily yields to a few applications of tampons dipped

in a preparation of ichthyol and glycerine, equal parts. In the subacute and chronic cases, however, the silver preparations are much more desirable. Nitrate of silver in the shape of a thin, flexible rod, so much used in the past years to cauterize the cervical canal, has been nearly discarded in ordinary cases, this cauterization being reserved for cases only where granulations are to be destroyed. Protargol I have found so far the best antigonorrheal remedy, and since the time I introduced this remedy in my clinic I have many times spared the curettement of the uterus. Protargol has been used in a 1 to 3 per cent. solution as urethral injections in cases of urethritis into the ducts of the Bartholinian glands, when affected, and especially in endocervicitis, and in endometritis for instillation in this organ. One of the instruments already referred to, the Talley's or the Haynes' double tube, has been introduced very gently into the cavity of the womb, care being taken to fill up the tube with the fluid before introduction, otherwise some air is introduced into the cavity of the uterus. Having the instrument in place, the fluid is pushed out of the syringe very slowly, drop by drop. I leave the catheter in for a little while, so as to give the fluid a chance to flow back. Without this precaution, if some of the fluid remains in the body of the uterus, the woman may suffer with cramps and uterine colic. After removing the catheter, a tampon is introduced to maintain the fluid in contact with the cervix.

The instillation of protargol into the uterus causes only a sense of heat in the hypogastrium, which lasts about half an hour. From this treatment the results have been exceedingly gratifying. Five to ten applications have been sufficient to bring the womb to its normal condition. Protargol in the beginning increases the discharge, which gradually diminishes and is reduced to a thin crystalline mucus. As soon as the gonococci have disappeared from the secretion, the instillations with protargol are discontinued, and the woman continues to use douches with a mild solution of permanganate of potassium, or with biborate of sodium.

So far I can not agree with Calmann on the superiority of formalin in this treatment, and I find that protargol is safer and more effective in subacute and chronic cases of gon-

orrheal endometritis. During treatment it is of great importance to watch the menstrual periods. While the woman has improved, her menses have returned to the normal condition, and the accompanying pains have gradually disappeared, yet after the menstruation some mucous secretion passes from the uterus. This secretion must be carefully examined for the gonococci. If gonorrheal germs are still remaining in the glands or in the folds of the mucous membrane of the uterus, when there occurs a menstrual hyperemia, it seems that they have more vitality, and are to be found again in the mucus. For this reason, before discharging a patient as cured, it is best to wait until her menstrual period and examine the secretion following the menstruation.

I must add a few remarks on the curettement of the uterus in gonorrheal endometritis, which has been resorted to as the only treatment for chronic gonorrheal endometritis. This operation has to be entirely avoided in cases in which the inflammatory process is still active. It increases the inflammation and often is the cause of the spreading of the gonorrheal process to the tubes and ovaries, producing disagreeable complications. In chronic cases for several years I have found the curettement the only remedy for chronic gonorrheal endometritis. From my hospital records I find that in 1895 I curetted in 14 cases, in 1896 in 30 cases, and in 1897 in 50 cases. After I began to use the treatment with instillation of protargol, as I have referred to, in 1898 I curetted 6 cases, and in 1899 to the present month only 2 cases.

This shows clearly the beneficial effect of this treatment, and I am gratified to state that in our ward in these last two years no complications have arisen on the part of the tubes, the ovaries or of the peritoneum. During the treatment we must not forget the general condition of the woman. We have seen that constipation is often connected with her sufferings, and for this I advise them to take half a glass of a mild purgative mineral water, with preference for the Apenta, which corresponds very well to the indication. At the same time the hypohemic condition must be attended to with a mild ferruginous preparation easy for the digestion.

Before concluding these few remarks I must remind you that gonorrhea sometimes complicates the delicate condition of the woman, pregnancy and the puerperium. Acute gonorrhea affecting the endometrium of the pregnant uterus is a cause of abortion. In chronic cases, however, pregnancy progresses without any trouble. In these cases the woman will irrigate the vagina with a mild solution of permanganate at a pleasant temperature, but the cervix and the uterus can not be treated directly with injections or with cauterizations, which would without doubt cause miscarriage. At the same time rest has to be recommended in order to spare the womb from shocks, which might result dangerously. After childbirth chronic gonorrhea of the cervix may spread to the endometrium and cause subacute endometritis, which is accompanied with severe pains, a copious discharge of sero-purulent secretion, which mixed with the lochia may give an idea of a septic condition. Differentiation, however, is easily made between gonorrheal endometritis and septic endometritis from the fever which in the gonorrhea is mild or absent and in the septic endometritis is very high, and in the smell of the lochia, which in the gonorrheal condition has no offensive smell, but which in the septic endometritis has a nauseous, unbearable odor.

It is unnecessary to say that the woman must be kept in bed in absolute rest; morphia must be administered to stop the pain, and hot applications on the hypogastrium have a beneficial effect. Warm irrigations with antiseptic solutions must be applied to wash the vagina and remove the secretion. Stronger applications are reserved until after the puerperal period is over.

Gonorrhea is not difficult to cure when we treat it in every affected organ. The trouble is in the possibility of reinfections. For this reason we must recommend, especially to a married couple when both have suffered with gonorrhea, the use of the condom for a long time, until both are completely cured.

XVI. VESICO-RECTAL ANASTOMOSIS.

BY J. FRANK, M. D.,
CHICAGO, ILL.

A series of experiments have been conducted on the implantation of the ureters into the rectum, sufficient in number to justify the following conclusion: That in every instance there is an ascending infection of the ureters which terminates in the kidney. Since this is a proven fact, as verified by both a microscopical and macroscopical study of the operated dogs, I have every reason to believe that no better result could be attained in the human being, and from this circumstance alone the implantation of one or both ureters can never become popular. Various operators have devised different methods for the relief of exstrophy of the bladder, but Maydl's is to be preferred as the safest and best, because, according to his technic, the ureteral openings are not anatomically interfered with, hence a fortification against ascending infection.

Why should the ureters be cut away from a healthy bladder when it is possible for the viscus to be left almost untouched and still accomplish the desired results? As some of the lower animals and birds have the bladder and rectum as one cloaca, the question arose, Why can not human beings live comfortably in the same condition? It is my object to place the unfortunate individual requiring this operation in the embryological state, by combining the bladder and rectum into one common receptacle, from which the feces and the urine pass.

For the operation which I am about to describe I have been unable to find any literature up to date upon this subject. However, should any gentleman present be acquainted with any literature upon vesico-rectal anastomosis, I shall be thankful to be informed of it.

The operation consists of anastomosing the bladder to the rectum with my decalcified bone coupler, a description of which can be found in the *Medical Record*, October 3, 1896,

the *Journal of the American Medical Association*, June 19, 1897, and in *Medicine*, January, 1897. The technic is as follows: In a male dog the incision is made in the groin, and in a bitch in the median line. Generally the bladder is found distended, and is emptied by squeezing it gently with the hand, when the urine escapes through the natural channel. The rectum is next picked up and freed of its contents, as in any intestinal operation. The bladder and rectum are then brought forward and placed in position for anastomosis. Two or three interrupted Lembert sutures are now taken about half an inch below the lower ends of the incisions determined upon in the bladder and rectum, care being exercised in selecting them that the coupler, when it is inserted, will not encroach upon the ureteral openings. A longitudinal incision is then made in the bladder large enough for the coupler selected, and a puckering string applied over and over the cut margin. The rectum is next opened in its long axis and a puckering string similarly applied. The suture should be taken so that the free ends lie uppermost, thus facilitating easy tying. The operator now slips the coupler into the bladder opening, at the same time gently spreading the collars apart, while an assistant makes one knot and draws down on the puckering string until the rubber tubing is felt. Another knot is made and the ligature cut off short. The other half of the coupler is then slipped into the rectal opening and likewise tied and cut off. Several interrupted Lembert sutures are taken around the borders to make the work more secure. The operation is very simple and can be accomplished in ten or fifteen minutes.

The opportunity of trying this new method on the human being has not been afforded me to date, although it was tried on the cadaver and the technic carried out nicely. Of the fifteen dogs which were operated upon, ten recovered and five died. In the first two experiments the technic was not yet perfected, and a great deal of unnecessary work was done, which undoubtedly contributed largely to the failures.

As a rule, the dogs are quite sick for the first few days, and show signs of pain, with rise of temperature. For a week after the operation urine and feces are voided oftener

than after this period. Dogs hoist their legs as though in the act of urinating, without accomplishing anything, and finally squat down and micturate from the rectum. The animals that have been kept accustomed themselves to their condition and urinated periodically. The feces were always passed in a liquid form, being softened by the urine.

It is my opinion that vesico-rectal anastomosis will not become popular for exstrophy, but will be resorted to for other diseased conditions of the bladder, especially where a suprapubic or perineal section is merely performed for temporary relief. I predict that in the near future the journals will record cases of vesico-rectal anastomosis in far greater numbers than gastro-enterostomy performed as a relief measure for a diseased condition of the stomach. The field for vesico-rectal anastomosis is much larger than that for gastro-enterostomy, and the results of the former operation will be more permanent than those of the latter. One great advantage that the human being will have over the lower animal is in irrigation, as the operated parts can be kept clean with antiseptic solutions at will, thus limiting the unavoidable, but only temporary, cystitis. Another point is that the human being is kept quiet on his back after the operation, hence feces are less liable to get into the bladder. The reverse is true in dogs. In exstrophy of the bladder the anastomosis should be made first, and then the plastic operation later.

Two of the dogs which were operated about six months ago are alive, in good health, and apparently as happy as other dogs that urinate through the natural channel.

The result of the microscopical and bacteriological study of vesico-rectal anastomosis is much more gratifying than that of implantation of the ureters into the rectum. The detailed account of each experiment has been omitted, as time would not permit the reading of it before this meeting. It will be published later, when the last dog is killed.

Dr. Maximilian Herzog, professor of Pathology in the Chicago Polyclinic, has made for me a number of *post-mortem* examinations, including a bacteriological and histological study of the material obtained from several of the dogs operated upon by the above described method. He furnishes

for this paper a short abstract of his detailed report, as follows:

The dogs were killed by chloroform narcosis at varying intervals after the operation. The body of the animal, as soon as life was extinct, was opened by a long median incision, in which the scar in the abdominal wall was avoided. The kidneys were then carefully, with as little manipulation as possible, freed and lifted out. The ureters were ligated close to the pelvis. The outside of the latter was rendered aseptic by a heated spatula, an extra strong platinum loop, heated to a red hot state, was then pushed into the pelvis, kept there a few seconds and withdrawn. Inoculations from the fluid and juices so obtained were made on blood serum and glycerine agar tubes, which were subsequently kept in the brood oven. Tissues from the kidneys and the site of the anastomosis were fixed in a four per cent. formalin solution, or in Zenker's fluid, embedded and stained according to various methods, including, of course, such for demonstrating bacteria.

Dog No. 4. Operated May 6, 1899. Killed May 21, 1899. Four cultures made, three remained sterile. One culture tube developed a growth, evidently an accidental contamination, neither the colon bacillus nor a staphylococcus. All internal organs normal. Anastomosis complete. Kidney tissue normal, no evidence of inflammation or degeneration.

Dog No. 8. Dog found dead May 21st, four days after the operation. Internal organs normal except large struma colloidea. Macroscopic condition of kidneys, ureters and bladder does not point to a cause of death as a direct consequence of the operation.

Dog No. 9. Operated May 21, 1899. Developing several days after a paraphimosis and gangrene of the penis. Was found dead June 9, 1899. Kidney, ureters and bladder show macroscopically no marked changes. All other internal organs normal. Anastomosis complete and firm. Microscopically, kidneys normal except as to one point. There was found in the medullary portion of the right kidney, near the pelvis, two small foci of round-cell infiltration. Bacteria are not demonstrable anywhere in the renal tissues.

Dog No. 13. Operated on June 1, 1899; killed June 28, 1899. Two culture tubes developed colon bacilli and diplococci. Kidneys and ureters macroscopically normal. Anastomosis complete and firm. Microscopical examination of the anastomosis shows that the intestinal epithelium has for a short distance grown over the surface of the bladder. Kidney tissue shows no appreciable histologic changes. There

are found, however, a few micro-organisms as follows: Right kidney, in the tissue near the surface of the pelvis, bacilli and a few diplococci; likewise in the cortex a few bacilli. Left kidney in medulla and cortex, a few bacilli.

Dog No. 15. Operated on June 10, 1899; killed three months later, September 11, 1899. Dog suffering from the red mange, but appeared otherwise well. Right kidney and ureter normal. Left kidney congested, ureter enlarged to double its normal size. Anastomosis complete and firm, on one side of it are found adhesions of omentum and a loop of small intestine. Culture tubes develop colon bacilli. Microscopic examination of tissue shows a very intimate union at the site of anastomosis, with practically no connective tissue scar, the muscularis and that of the bladder being in the closest apposition. The tissue of both kidneys shows inflammatory changes and contains colon bacilli.

A uniformly striking feature of the histologic examination in all cases is the very complete and firm union of the vesical and rectal tissue at the site of the anastomosis.

From the above, it will be noted that in only one experiment, No. 15, was there any macroscopical evidence of a change from the normal. If then, the careful microscopical work had not been carried out in my series of experiments, a complete recovery could be claimed in every instance, so far as the behavior of the dog prior to the *post-mortem*, and to the appearance of the organs at that time, with but the exception already noted in experiment No. 15. I again repeat that in all my experiments of ureteral implantation an infection of the kidney resulted, and this fact led me to devise the new operation.

From all the literature which I have been able to study on the subject of ureteral implantation, few contain a microscopical report, and therefore are absolutely worthless as regards the subject of kidney infection.

From the report just finished, two points will be observed: First, that the recovery of the dog and the macroscopical appearance of the tissues does not necessarily signify absence of infection; second, in the dogs killed thus far the operation of vesico-rectal anastomosis can be performed without a resulting kidney infection.

DISCUSSION.

DR. H. O. WALKER, of Detroit, Michigan.—It seems to me, we ought to say a word in commendation of the author for devising this operation. It strikes me as a new departure, and may prove of lasting benefit in a certain class of cases. My experience with ureteral implantation is somewhat limited, and in reading the literature on the subject I have not been impressed with the favorableness of the operation. Judging from the experimental character of this procedure, it will unquestionably prove of great benefit, and do away with implantation of the ureters into the rectum.

DR. THOMAS CHARLES MARTIN, of Cleveland, Ohio.—There are two kinds of papers presented before medical societies, some that are good and call forth much discussion, and others too bad to merit any discussion. This paper certainly belongs to the first class. Surely, the medical profession is under great obligation to Dr. Frank for his valuable practical suggestions. It seems to me that he is rather less enthusiastic than he is justified in being, for in a human subject, who has exstrophy of the bladder, it might be possible to perform this new operation without opening the peritoneal cavity.

XVII. OBSTIPATION AND ITS RADICAL TREATMENT.

BY THOS. CHAS. MARTIN, M. D.,
CLEVELAND, OHIO.

The rectal valve* is an individual anatomic organ in itself, and must now be reckoned with in studying the operations of the integral mechanism of defecation.

(1) *Digital Observation on the Non-anesthetized Subject.* In the normal rectum when the first rectal valve can be reached by the finger, provided it be immediately discovered on its introduction, a definite but not rigid band of tissue may be felt buried beneath the masses of lax mucosa. This band presents at one side that which seems to be a circular aperture

*OBSTIPATION: A Practical Monograph, by Thos. Chas. Martin. *The Philadelphia Medical Publishing Company*, is freely quoted from in this paper.

of variable diameter; a few seconds of passive application of the finger detects a gradual relaxation of this ring-like constriction till the finger can discover only an indefinite thickening on a side of the gut wall. If the finger be held passive this constriction may again surround the finger, but if so, it does so with a somewhat weaker grasp. Often the presence of the finger within the rectum excites a peristaltic contraction during which the valve usually cannot be detected. Now if the rectum be filled with water the valve may be more readily discovered by the finger, and when discovered the diameter of the valve-strait is observed to be greater than that before noticed, and the grasping tendency of the valve is not so noticeable.

(2) *Ocular Observation on the Anesthetized Subject.* If a somewhat emaciated male be selected, one whose rectum is susceptible to atmospheric inflation while in the lithotomy posture, and if the large intestine be freed from its contents, if such a subject be anesthetized and his colon or sigmoid filled with water, and the anus divulsed and held open with the speculum, the water confined to the rectum may be bailed out and the rectum will then be seen to present the multi-chambered condition which I have described elsewhere. If the inquirer will now place a hand on the abdomen over the water-filled sigmoid flexure and give the part a quick, firm pressure, his watchful eye may observe a downward rush of waters into the rectum, first striking the concave wall formed by the junction of the upper surface of the uppermost visible valve to the adjoining rectal wall, bounding from this surface to the opposite next lower valve, from which the stream is deflected to a lower point on the opposite wall, by which time all may be obscured by a wave of contracting peristalsis, rythmically repeated, which may project small quantities of water through the anus. In the intervals of the contractions the rectal chambers are observed to be either submerged or else atmospherically inflated.

(3) *Ocular Observation on the Non-anesthetized Subject.* If a subject under proctoscopy be directed to bear down, it is observable that the empty and atmospherically inflated rectum closes under the compression of the voluntary forces by the concave anterior wall becoming convex, and being carried

backward toward the fixed posterior wall, the transverse diameters remaining apparently but little shortened. The compression may be noticed as being applied from before and in a backward direction, and simultaneously from above downwardly. In case firm fecal masses, or lubricated balls of cotton experimentally placed, be dejected by these efforts, there may be noticeable depression of the valve floor under the pressure of the descending mass. Presently the mass will appear at the valve-edge, where it may be seen suspended for a few seconds before it is plunged on into the next lower chamber. Occasional rhythmic contractions of the rectal muscular coats or a closure due to deep inspiration may occur, which fill and transitorily obscure the field under observation with masses of reduplicated mucous membrane; and in the normal rectum it is always possible to note that such contractions have changed the positions of the scybala.

These observations warrant the conclusion that the rectal valve has a definite function. Its histologic elements endow it with essentially passive and active properties. When the muscular elements are relaxed and the gut is either greatly dilated or else is even in lesser measure distended, the valve is passively supported by its fibrous band across the channel to resist the hurried or uncontrolled descent of the feces. The presence of the band of fibrous tissue under the free margin of the valve provides a *control* to receive and retain a bolus, or, it may be said, the several valves receive a series of boluses, till a sufficient pressure is made to stimulate the complex involuntary mechanism of defecation to a further propulsion of the feces or to reversed peristalsis. The presence of the feces or the involuntary movements incident to their presence, signals the consciousness to co-operative voluntary expulsory effort or gives warning of the necessity of voluntary resistance. In the event of the exercise of these forces in the direction of resistance, there seems to be some reason to believe that the antiperistalsis returns at least a portion of the feces to the sigmoid flexure. The valvular arrangement of the rectum provides for the minimum expenditure of energy on the part of the voluntary forces for the reason that the gut's contents are collected on the surface of the unyielding sacrum, and steadied there to receive the pressure of the really expulsory

voluntary efforts. Such an arrangement of the feces further facilitates defecation for the reason that the entire contents of the rectum is not rushed upon the anus at once. The surgeon remembers that it is usually impossible to reduce hernia *en masse*.

The bundles of circular fibers which constitute the muscular element of the valve probably belong to the same mechanism, and have the same function as those which form the ental sphincter. Their usual state is that of tonic contraction; they are relaxed by inhibition; when the muscle is in a state of inaction and the rectum is dilated, the fibrous bands are projected and passively support the valves across the channel of the rectum. In health the valve is susceptible under pressure of a temporary effacement.

If it be the function of the normal rectal valve to beneficently retard the descent of the feces, it is obviously true that it may be the especial property of the valve, in certain other than normal conditions, to maliciously obstruct the descent of the feces.

My experience convinces me that a perfect knowledge of the rectal valve constitutes the key to an understanding of obstipation, rectal stricture and their sequels.

The Symptoms of Obstipation. The patient is the subject of more or less chronic irregularity of defecation. He some days makes frequent partially successful attempts to evacuate the rectum, but may experience an unrequited desire for stool. The patient acquires the reprehensible physic habit. In time the periods of obstipation are interrupted by diarrhea. There is commonly an ineffectual straining at stool except for fluid feces. Later, the diarrhea occurs with greater frequency, and ultimately long periods of diarrhea may ensue, which are interrupted by a transitory obstipation and constipation. All these symptoms may be accompanied by increasing degrees of flatulence and borborygmus, and from time to time the patient is subjected to attacks of intestinal autointoxication, and finally he becomes neurasthenic. On account of the special non-sensitiveness of the rectum, the patient's sufferings are not uniformly referred to this region by himself, but in many instances, however, the intelligent patient is prepared to present his physician with a ready-made diag-

nosis of rectal obstruction. Finally the symptoms of intestinal obstruction become pronounced, and if the patient be unrelieved, the disease proceeds to a fatal termination. Pain, aching in the sacral region, hemorrhage, proctorrhea, prolapse, hemorrhoids, fistulas and so forth, are usually concomitant sequels of the hypertrophied valve, and these may embrace the entire proctica.*

OPERATIVE TREATMENT.

Divulsion. Frequently repeated massage of the obstructing valve by means of the coactor is often sufficient for a cure of minor valvular hypertrophy.

Section. Obstipation from anatomic coarctation of the rectal valves, congenital hyperplasia, and hypertrophy of the rectal valve of limited degree, may be relieved by a simple valvotomy, which may be performed as follows: The patient should be placed in the proper posture, and the proctoscope introduced and given into the hand of an assistant. The valve to be divided should first be seized by means of a sharp hook and steadied. The hook should be made to grasp the mucous membrane and fibrous border of the valve only. The valvotomy bistoury should be made to transfix the superficial portion of the conjoined tendon of the valve, and to divide this tissue and the mucous membrane covering it by cutting its way through the valve's free-border. Or the valve may be seized by a long T-clamp—especially designed for the purpose—and the free-border cut through, by carrying a scalpel downward till arrested by the cross-bar of the T-clamp. It will now be noticed that the transverse diameter of the valve-strait is increased, and that the increased expansion of the rectum will contribute the divided valve-structures to the circumference of the rectum, and that the V-shaped wound has become almost linear in form. If other valves should require similar attention they may be operated upon in the same manner.

I have performed more than fifty valve sections, and with the following exceptions the patients have made complete recoveries: One patient is unimproved at the present time,

* "Phantom, Semilunar and Annular Strictures of the Rectum," by the writer, *The Journal of the American Medical Association.*

for the reason that I was not given an opportunity to finish my work. One patient was vastly benefited, but the defecation had not become perfectly normal three months after the operation. I have recently repeated the operation on this patient. Sufficient time has now elapsed for me to report a perfect recovery. One patient I have not heard from since the fortnight following the operation, but during that fortnight she was practically relieved of her obstipation and its concomitants. One patient was the subject of obstipation and constipation; he had pyloric stenosis and valve obstruction; gastro-enterostomy and valvotomy did not restore normal defecation.

The following is the case of Dr. S. B. T. The anamnesis was written by himself. This case is typic in almost every particular. I present it because the gentleman is present at this meeting.

"I am a physician, 31 years of age and reside at Columbus, Ohio. To the best of my knowledge my parents were never affected with rectal disease. As a child I never suffered from rectal trouble. The first indication of obstipation was in 1889. Since then it has gradually grown worse, becoming very much worse in December, last.

"In November, 1889, I suffered an acute rectitis, which lasted three weeks. It was followed by obstipation. During the nine years from December, 1889, to December, 1898, I suffered more or less distress when at defecation. The rectitis became recurrent in character. The attack in last December proved the worst and most lasting, and seemed to be superinduced by an attack of influenza. I had severe backache and aching down the thighs. Straining at stool was constant and always ineffectual. The transverse descending colon and sigmoid flexure were always distended with gas. The discharge of gas seemed obstructed in the left iliac region. This accumulation of gas caused pain and tenderness in this region. Further than this, the distention of the colon gave me the sensation as if I had a brick in my abdomen. There seemed to be times when the flatulent condition was almost unbearable. The last two weeks preceding the operation this condition was constant. At times there was discharge of mucous casts, occasionally streaked with blood. Microscopic examination of these deposits revealed nothing pathogenic. I was very much depressed mentally, cross, irritable and melancholy. Preceding operation for ten years I never laughed

aloud. I consulted several of the leading physicians in my city (having previously made a diagnosis, myself, of stricture), each in turn gave the stereotyped diagnosis: overwork, neurasthenia, nervous indigestion with concomitant constipation. It is not surprising to note that laxatives and physic of all kinds gradually became ineffectual. Plain and medicated enemas were tried. It was possible to retain only about half a pint of the fluid. Finally the enemas, too, were without result. One physician recommended the long rectal tube for placing the enemas. I found it impossible to use this instrument, as it refused repeatedly to pass the obstruction. It caused much pain at the time of the attempts, and provoked tenesmus and aching in the rectum.

"On July 16 Dr. Martin operated on me. On my return to bed I suffered no discomfort and absolutely no pain whatever. Gas passed easily without stoppage, and all symptoms of obstruction had disappeared. On the morning after the operation I received a three-pint enema and voided the contents of the bowel for the first time in eight months without the combined use of physic and enema. Enemas were employed for three weeks with like result. Since discontinuing the use of enemas the bowel movements have been perfectly normal, acting once and sometimes twice each day. Good spirits have returned, I have a good appetite, and have gained about sixteen pounds in the past four weeks. I have taken neither cathartic nor laxative medicine since my operation.—S. B. T., October 1, 1899."

On July 3d I examined Dr. T. and discovered a much dilated sigmoid flexure, which was somewhat tender on pressure. Proctoscopy revealed moderate anatomic coarctation and considerable hypertrophy of the two lowermost rectal valves. There was some degree of congestion of the rectal mucosa extending from these valves to the anus. Above them the mucosa was of a pale gray color and the superior rectal chambers were enormously dilated. I advised valvotomy.

On July 16th, without the employment of any anesthetic agent and without causing pain, I divided in two places the conjoined tendons of each of the valves which were coarctated and hypertrophied.

DISCUSSION.

Dr. Sterling B. Taylor, of Columbus, Ohio.—In connection with this paper I desire to say, as to my own case, I am still gaining in flesh, after having been operated on by Dr. Martin. I now weigh 130 pounds. I have had no indication of obstipation since that time. It has been my pleasure to see a normal rectal valve and a hypertrophied valve in other patients.

Dr. J. R. Pennington, of Chicago.—I want to say that for some years Dr. Martin has been hammering away on this subject. It has been given the go-by, so to speak. I saw him demonstrate some cases at the Columbus meeting of the American Medical Association, and since that time I have investigated the subject thoroughly. I am sure now that a rectal valve exists. It is not like the mucous membrane that is referred to in text-books, but it is a valve, easily demonstrated, and I know that section of this valve, particularly when it is diseased, will relieve constipation.

XVIII. SOME COMPLICATIONS MET WITH BEFORE AND AFTER OPERATIONS FOR HEMORRHOIDS. THEIR CAUSES, PREVENTION AND TREATMENT.

BY JOHN L. JELKS, M. D.,
MEMPHIS, TENN.

I shall not mention all of the complications which might be enumerated, but will give preference to those which have most frequently and interestingly attracted my own attention, and by so doing I shall probably recall to the minds of some others mishaps which will be of interest. It is by the experience of others we are taught many fruitful lessons, and by our own experiences we become artists.

The first of these complications which I mention is *superfluous skin* and *redundant tissue*, for it is usually the first

noticed in the examination preparatory to operation. Indeed, sometimes examination of the inner strictures is made very difficult.

CASE I.—W. B. Operated on September 16, 1899, presented almost a complete occlusion by the great number of tumors and tags projecting, and when they were all removed there had been, surgically speaking, a complete circumcision of the anal ring. In my initial work in this branch of surgery I confess my inefficiency, for I recall a number of cases in which from two to seven days after operation I removed tags of skin which had swollen up to several times their former size, therefore, I am now in the habit of making as correct calculation as possible of the amount of this tissue before dilating the sphincters, and afterwards removing all of it with deliberate and fearless excision, made best with scissors. However, if, after an operation this complication presents itself, time will be gained, and a better recovery insured, by injecting these with a one per cent. cocaine in salt solution and excising them with scissors. This complication yet failed to appear at times.

CASE II.—Mr. R., operated on for hemorrhoids and ulceration, in St. Joseph's Hospital, July 21, 1899, presented much superfluous tissue, and I was dealing so liberally with this that the attention of those witnessing the operation was directed thereto, as the following remark would indicate: "Doctor, are you not afraid of contraction after so liberal excision?" Yet, before dismissing my patient I excised two tags of tissue.

The second complication is that of *ulceration*, which is a frequently noticed condition, and amounts to a great deal in the causation of unpleasant symptoms. In some cases a simple abrasion of mucous membrane with granular or smooth base and ill defined edges, which, unless grasped by the sphincters, elicits few if any symptoms, may be entirely relieved by the dilatation of the muscles and application of carbolic acid. If, however, this ulceration is within the sphincter's grasp, it should be excised or curetted, and then cauterized. More serious are those which are deep, and have an unhealthy base with either well defined or ragged edges. After dilating the muscles and antisepticizing the gut for some distance above, and before any further work is done which might obstruct the field with blood, the ulcers are

curetted with a sharp irrigating curette, and, if thought best, the edges pared with scissors, after which the application of pure carbolic acid controls the hemorrhage and insures detachment of any remaining devitalized tissue.

Hemorrhage occurring at any time is a symptom fraught with a greater or less degree of danger. This complication I have never witnessed post-operative when the ligature was used, and I attribute this fact to the great strength of the ligatures, and the care with which they are applied. On one occasion, and that very recently, I observed immediately after cutting away a tumor that the ligature slipped off, and a violent hemorrhage ensued. I considered myself and the patient very fortunate, for had this ligature slipped ten minutes later my patient's life might have been sacrificed. The base of tumor from which the hemorrhage ensued was caught up and tied tightly. I could explain this occurrence only in the probability of my having cut the tumor off too near the ligature. Unless hemorrhage has been so great as to render a patient pulseless at wrist, I think it wisest to go into the bowel and catch up the bleeding point and tie it, rather than in a moment of excitement plug the rectum with that septic nidus, a tampon. I have used a tampon but twice for the control of hemorrhage from the rectum, and these after internal proctotomies for stricture; both cases died of sepsis, and previous loss of blood.

I recall two patients in whom hemorrhoids were removed and all hemorrhage stopped after the patients were almost exsanguinated, yet these came from under the operation in fairly good condition, and made uninterrupted recoveries. Simply as an example of the gravity of these cases, I cite one of them.

CASE III.—Mr. N., age 40, having hemorrhages for several years, had one year previous to my surgical attention been advised by me to be operated on without delay. One day, while in a drug store making purchases of pile remedies, he fell in a faint upon the floor, and was soon after carried to St. Joseph's Hospital, where an effort was made to resuscitate him. He seemed to do better for a few hours, then grew worse in the night, and once more fainted, after passing a half chamber full of blood. In the early morning he was

taken to the operating room in a very weak condition, but bore ether much better than men usually do, and under the administration of strychnine and trinitrin elicited better pulse volume and tension after than before the operation, and made an uninterrupted recovery.

These cases should, of course, be operated on in all haste possible with the proper degree of thoroughness. Another

AUTHOR'S HEMORRHOIDAL FORCEPS.

cause of post-operative hemorrhage might be assigned to the instruments used to catch up the tumors. Those which I had seen used were either calculated to tear the tumors, or to catch and pull them down unevenly. To overcome this

objectionable feature I devised a forceps which catches tumor evenly at base, does not tear, and which, while not bulky, facilitates accurate and complete dilatation. I have in two instances tied bleeding points and controlled hemorrhage in cases coming to my office.

Bladder and Prostatic Abnormalities and Diseases. In an article read before the Tennessee State Medical Association in 1898, on "Prostatic Irritability and Enlargement, a Sequence of the Hemorrhoidal State," I think I plainly, and to my professional brethren who were present satisfactorily, demonstrated that these conditions may be either measurably or entirely due to hemorrhoids, and their removal effect entire relief to the sufferer. Since then I have proven this a fact by results. Where much bladder or prostatic trouble is present I would here again impress the fact that special attention should be given the portion of gut approximating.

Fissures are sometimes encountered, and are the most painful of all rectal ailments.

Illustrating this painful condition is Case No. IV, a patient brought to me last winter from Arkansas. This man refused any examination prior to the anesthesia, and said that when his bowels were compelled to move he would cry as a whipped child, though he was a man of strong physique, and character. This case had been previously treated by the injection of carbolic acid, had a great deal of redundant tissue and severe ulceration, a heart murmur and a hernia. He did well after operation, until, against my will and entreaties, he left the hospital too soon, rode one hundred miles on a day coach, and immediately thereafter six miles over a corduroy road in a wagon during the most unpleasant weather of last winter. An edema which followed laid him up three weeks. The only treatment of fissure after thorough dilatation is to excise its base, and of course attend to any other pathological conditions of these parts, as in this case I removed several tumors and treated the ulceration.

Uterine Disease. A surgeon is dealing in unfortunate circumstances when, in connection with simple and, ordinarily, easily relieved rectal trouble, he encounters serious disease of the uterus and adnexa. Especially is this true when the subject of such conditions is one also of hysterical temperament.

Without the entire relief of both or all conditions she would probably feel that little benefit had been given her. This relationship was referred to in my article read before this association last year ("The Relationship between the Genito-Urinary Tract and Rectum. In Operations On the Female Which Should Receive Priority?") Case No. V beautifully illustrates the gravity of this class.

Case V.—I was called forty-five miles out of Memphis to operate for hemorrhoids and chronic obstipation, and upon arriving I did not find the serious trouble in the rectum which had been pictured to me. I removed four small hemorrhoids, and cauterized some ulceration. In addition to the rectal trouble, however, I encountered an endometritis, the uterus being three and one-half inches deep. A thorough curettage was followed by cauterization of uterus. She seemed to improve for a time after operating, then relapsed into her former state of melancholia, and rectal pains. A second visit was paid her in June, and examination elicited no trouble in the rectum, except slight superficial ulceration. She had one month before this aborted. Again I found a deep subinvoluted uterus, and endometritis unimproved. Curetting uterus with sharp curette, and thoroughly cauterizing it, I learned she did well until one week later her sister became seriously ill, and she arose from her bed, and for two weeks sat over this member of her family day and night. A letter from her physician indicates that she is yet a sufferer, and, as he expressed it, is almost a monomaniac on the subject of her rectum. What can be done for such a case, unwilling to go to the seashore, or to a hospital where she can be placed in bed, and a period of rest treatment given her? I confess that these are the most unsatisfactory of all rectal ailments benign in character. In this case getting up too soon is the chief cause of failure, I think, for to a great degree we must rely, in such cases, upon rest and that *vis medicatrix naturae*, for the patient may be classed now as a neurasthenic and must remain so until time and rest can restore her.

Syphilis and Gonorrhea may be and often are causes of rectal troubles; especially is the latter an exciting cause of the hemorrhoidal state, as I have often noted in the course of treatment of this disease. When a subject of a hemorrhoidal condition unfortunately suffers a gonorrheal infec-

tion the latter becomes a serious complication, and the treatment of one or both conditions varied by the circumstances in, and the relative seriousness of both; therefore time will not permit a comprehensive discussion of these associated conditions.

Tumors and Pregnancy. While the latter amounts to a complication, and indeed often causes hemorrhoids, I think as a rule only palliative treatment should be instituted. Such treatment consists of the administration of salines to unload the pelvic vessels, and rectal injections of hydrastis and hamamelis, and the use of suppositories of stramonium, morphine and aristol. In tumors, however, or a displaced uterus the hemorrhoids should be removed, and at the same time replacement and support given the uterus, or in the case of tumor its removal should follow in many cases.

Stricture of the Urethra, like cystitis, is a grave complication of hemorrhoids, or may be the cause of their development. In this condition, unless the hemorrhoids be serious, by reason of hemorrhage, the operation for stricture should precede that for hemorrhoids.

Ischio-rectal Abscess and Fistula. In the former condition, when complicating hemorrhoids of long standing, I usually operate on both conditions at once, and have in the several cases within my experience found no contraindications. In the latter case, if it be one with only a slight hemorrhoidal condition, dilatation of the sphincter prior to cutting the fistula will suffice. I can recall a number of such cases, but the mention of two will suffice.

CASE VI.—In June, 1899, I was called by Dr. W. S. A. Castles to Oakland, Tenn., a town thirty-five miles from Memphis, to operate on a man for fistula. His time was precious, and he insisted upon being laid up as short time as possible. A hemorrhoidal condition was present, and I tied only one tumor, but dilated the muscle thoroughly. His words to his physician are, that he "is as sound as a babe in that region."

CASE VII.—On August 19, 1899, I operated on Mr. C. for ischio-rectal abscess of recent appearance. When I dilated the rectum some tumors of seeming recent development presented, and two deep ulcers, one of which was on the same

side as the abscess, and to which I attributed the infection of the fossa, the other on the posterior wall of the rectum. The ulcers were cauterized after curetting. Then the abscess was opened, and five tracts leading off in various directions were divided to their extremities. No entrance was found or made into gut, and no tumors were removed. The wound was a large, ugly one, the tissues presenting an unhealthy appearance. Scissors and a sharp irrigating curette were used to detach a great amount of this devitalized tissue, and afterwards wound packed with gauze, and the case progressed nicely, and was dismissed as well. Though hemorrhoids of recent development were present at the time of operation, he says he is entirely relieved of both conditions, and of the chronic constipation from which he has suffered for years, and I believe he will not have any further trouble.

Effects of Carbolic Acid when used for the destruction of hemorrhoids. I have had presented to me during the last eight months three cases in which carbolic acid had been injected for their relief, and the result in each was more or less disastrous, as one case, report of which follows, will illustrate.

CASE VIII.—On September 14, 1899, I was requested by Dr. R. S. Stanley, of Memphis, to see a woman who, some months ago, had a hemorrhoid injected by another physician, after which there followed an abscess anterior to bowel, which broke, and discharged a large quantity of pus. The sloughing that continued has completely destroyed the perineal body, leaving no support to the gut for two inches above. The bowel is prolapsed, and forms an indurated and inflamed mass the size of a cocoanut. The sphincter avails her nothing, since its interior portion has been destroyed by this sloughing process. Indeed, I am at a loss to know what hope might be entertained for this subject's restoration to health, if indeed her life may be spared. That this is not a cure, the following illustrates:

CASE IX.—Mr. H., operated on February 15, 1899, had been operated on in a town 100 miles from Memphis three months before I saw him. Though a young man, he used a stick to steady his otherwise uncertain and painful navigation. Seven tumors were removed, and the two deep ulcers and general proctitis attended to. I think there was scarcely room for the tumors which were claimed to have been destroyed with acid.

DISCUSSION.

Dr. Joseph M. Mathews, of Louisville, Ky.—This is a very practical paper, suited to the general practitioner better than the surgeon, because we all meet with such cases as have been reported. Every once in a while there is a new operation devised for hemorrhoids, or some new treatment advanced for the relief of this condition. It is tried for a while, and generally found wanting. I do not suppose any surgeon to-day uses carbolic acid in treating piles or internal hemorrhoids. If they do, they will meet just such complications as the essayist speaks of. These complications are so serious as to wreck a man or woman's life. I have seen them, and I am sure that you have. The real operation for hemorrhoids, tumors protruding from the rectum, narrows itself down to surgical interference. They cannot be treated otherwise. I refer now to the use of the clamp and cautery, and the ligature. The thing is to get them away with the least trouble to the patient and surgeon. The clamp and cautery is not followed by the complications he speaks of. Others seem to think that these complications are followed oftener by the use of the ligature than by the clamp and cautery. It is like all questions, it has two sides. Allingham, of London, who has done hundreds, possibly thousands, of operations for hemorrhoids, says that the clamp and cautery is followed by the least complications. Smith says he is mistaken about the clamp and cautery, but a good deal depends upon the method one is accustomed to. If he uses clamp and cautery, he is more apt to stick to them.

I was a little surprised to hear the doctor speak of so many complications following operation for hemorrhoids. Dr. Gross and Mr. Ericsen both said it was the simplest operation in surgery—that is, to tie a hemorrhoid, cut it off, and let the man get well. Those who believe in the clamp and cautery consider it the simplest operation of all. As far as my practice is concerned, I have not met with these complications. Take, for instance, the ulceration the doctor speaks about. I can not see how we are going to have any ulceration following an operation for hemorrhoids if we attend to the after-dressings.

Dr. Jelks.—I spoke of post-operative ulceration.

Dr. Mathews.—These complications do not follow the simple operation.

With reference to hemorrhage, I have seen but one post-operative case of hemorrhage, and in this the ligature slipped off. If it had not been cut too close or tied too loosely it would not have slipped off. I tied off seven large

hemorrhoids one afternoon, shortly after which the patient went home, visited me the next morning, and departed with seven ligatures in him. He traveled to his home in Louisiana, and made a good recovery. I have had patients do that several times.

There is a complication that Dr. Jelks speaks of which is of serious import, and will get the rectal surgeon into more trouble than any other one thing I can imagine, that is, stricture of the urethra as a complication of hemorrhoids, or any other trouble in the urethra, a cystitis, or an enlarged, irritable or inflamed prostate. If we promise such patients that we are going to relieve them of their trouble by ligating the hemorrhoids, I care not how large the hemorrhoids may be, when we get through the patient is in just as bad a condition, or worse than he was when we began, so far as the symptoms are concerned. There are a great many people who consult the rectal surgeon that have no case for operation, the trouble being in a urethral stricture.

The complication in women of a displaced uterus or ovarian trouble, or what not, causes a great deal of trouble, as far as the operation upon the rectum is concerned. At the same time, if a woman is troubled with a large mass of hemorrhoids, simply because of their mechanical obstruction to the outlet, or the inconvenience of their protrusion, she should be operated on, it makes no difference whether the uterus be displaced or not. It may be that a displaced uterus will cause hemorrhoids to exist and to protrude. I would operate on such women and remove the hemorrhoids, to relieve them of their distress, regardless of what condition of the uterus or ovaries they may be suffering from.

Another condition complicating hemorrhoids the doctor speaks of is pregnancy. Physicians often say to patients, you need not have this surgical operation done, and it is best not to have it done, for the removal of the hemorrhoids. Personally, I would not leave a woman to suffer three or four months with an irritable ulcer of the rectum simply because she is pregnant. I would give chloroform and operate. If these hemorrhoids are ulcerated, giving great pain, they must protrude from the rectum, and we are perfectly justified in chloroforming the woman and removing them. I do not say that in every case this should be done, but in many pregnant women, by pressure, the hemorrhoids are made to protrude, and they will take care of themselves after the child is born. I am speaking now of the condition that the doctor refers to, where we have a mass of hemorrhoids ulcerated, causing great pain. You can not stop any of them; even with the complication of pregnancy I have performed the operation

several times, and I would do it again. These, I believe, about cover the points in the doctor's paper. I want to say this, in closing, that the doctor will get rid of the first complication, which means swelling of the superfluous skin, by the method of free excision of the mass—Whitehead's operation, if you please. But any way, do not leave any superfluous skin there to swell up; make a circular incision all around by treating the mass and excising it. This idea that we are going to have contraction and ulceration, and all such complications, is a mistake. Every one knows how rapidly healing takes place after this operation. There is very little pain caused after the ligature has separated, and nature restores the mucous membrane. I favor just exactly what Dr. Jelks does—the ligature, and free cutting and entire removal of the hemorrhoidal mass whenever we operate for that condition.

Dr. John R. Pennington, of Chicago.—I desire to say a word or two in reference to this paper. One of the principal points I wish to refer to is the tampon which he mentioned in dressing the wound after operation for hemorrhoids and the hemorrhage. Hemorrhage, after operation for hemorrhoids, is small. There is no need to fear it if one dresses the wound properly after operation. A large mass of hemorrhoids can be cut off entirely without the ligature, clamp or other means to control the hemorrhage, and if the wound is properly dressed there is no fear of hemorrhage resulting.

Again, the tampon has been referred to as a source of infection. I do not see how a rectal tampon, properly made and applied, is a source of infection. On the contrary, it will prevent infection, and leave the wound in a better condition.

Dr. C. Lester Hall, of Kansas City, Mo.—It is quite astonishing to hear a recital of our different experiences in the treatment of hemorrhoids. With what practical work I have done in this line, I should not presume to express an opinion after those gentlemen who practice rectal surgery entirely. But I have never been able to devise a tampon for the rectum that was not a source of irritation and very great pain to my patient when it protruded from the center. If it fits the sphincter ever so well, I have never been able to put a tampon in the rectum after operation without giving the patient trouble and myself cause for regret. I can not see why, if our work is done thoroughly and the ligatures carefully and properly applied, we can not leave the rectum alone without using a tampon to provoke spasm of the sphincter

muscle. I am much better satisfied to do the surgery and let nature do the balance.

I wish to mention a case bearing on a remark made by Dr. Mathews in regard to pregnant women who suffer severely from hemorrhoids, who will be relieved after delivery is accomplished. I have one case in mind of a lady, it being my second or third visit after the completion of labor, and on the second day she was ready to go into convulsions from intense pain. The hemorrhoids greatly increased after labor, and so severe was the pain from their presence that, without any great preliminary preparation, I ordered the nurse to give chloroform and I removed the hemorrhoids. At the subsequent confinement, she having failed to apply for any further treatment, I found it was necessary to repeat the same operation, both of which gave immediate relief.

Dr. Vincent J. Hawkins, of St. Paul, Minn.—I am not a specialist. The greatest complication to me has been the pain from which the patient suffers after operation. It may be that I do not know just how to apply the ligature. My observation is not confined to my own cases entirely, and I find it in the patients of other physicians. I should like to have the essayist enlighten us some on that point. We are told that if we apply the ligature properly we do not have pain. I have tried to apply it according to the rules and methods that are laid down in recent text-books, and still I get this complication (pain) in at least one-third of my patients. In some of them the pain is intense, so much so that I have had to give hypodermics of morphine, one after another, to relieve suffering.

As to hemorrhoids and confinement, Dr. Hall has touched upon this subject. I believe in that class of patients the majority of men in general practice at the present day, after the confinement is over, neglect their duty if they do not examine the rectum for protruding hemorrhoidal tumors the same as they examine the perineum for lacerations. I always do it, and, as a rule, if I can return the tumor or tumors and have them remain above the sphincter, my patients get along without any trouble. But if the tumors will not remain above the sphincter, it is wiser to remove them at that time than to let them go; in fact, it is just as essential, in my opinion, to remove these tumors as it is to restore a lacerated perineum.

Dr. S. B. Taylor, of Columbus, Ohio.—I disagree with Dr. Mathews in reference to two points. In the first place,

the remark has been made by him that hemorrhoids do not come within a week from pressure. From painful experience, I know that they can come within two suns.

DR. MATHEWS—What kind, doctor?

DR. TAYLOR—You did not specify; you took in the general class of hemorrhoids. In the second place, I am willing to agree with Dr. Mathews that hemorrhoids should be removed when complicating pregnancy, but I can not concur with him in the use of chloroform to that end. On the other hand, I would recommend the infiltration method of some local anesthetic, preferably eucaine to that of cocaine.

DR. H. O. WALKER, of Detroit, Mich.—The subject has been so thoroughly discussed that there is very little left to be said with reference to the complications of hemorrhoids. There is one point I wish to speak of; that is, the ligature in the treatment of hemorrhoids is about passed. I see no reason why we should not operate for hemorrhoids just the same as we do any other operation. It is considered by some that hemorrhage is a great bugbear, but I never saw a case yet that would bleed to death. I have used the clamp and cautery, I have injected hemorrhoids with all sorts of things, but latterly I have come to the conclusion that the way to do is to remove the hemorrhoids and leave as much of the mucous membrane as possible, letting it hang down, put in a small tampon, keep the parts clean, and the patient will get well in a few days, and be relieved of the intense pain which the ligature gives.

DR. THOMAS CHARLES MARTIN, of Cleveland, Ohio.—I quite agree with Dr. Walker that the ligature is a method of operating that should be abolished. The clamp and cautery, if properly used, will enable us to operate without general anesthesia; the operation made painlessly, I do not care how large the hemorrhoid. But the subject of the paper is not the choice of methods of operating. I do not believe hemorrhage to be a common complication in operating for hemorrhoids. It occurs rarely, and when it does occur it should be checked, otherwise the patient may pass in his checks. I desire to mention a simple method which may be employed by the nurse, attendant, or a member of the family, in case the surgeon is not at hand. The attendant should be instructed at what position in the circumference of the anus the operation was performed; if it was upon one side, it should be specified, and the patient instructed to lie upon the opposite side. In case of hemorrhage the patient should be turned into the flexed position and upon the opposite side

from that on which he was operated, with buttocks drawn to the edge of the bed; the nurse should be placed in convenient position; the thumb should be lubricated and introduced into the anus, the arm resting upon the buttocks, pressing upon the point where the wound was made.

DR. JELKS (closing the discussion).—I appreciate very much the free and favorable discussion that my paper has elicited. I have tried to make it practical, and I believe you have considered it so. There are two or three things I want to mention, and before closing the discussion, I would ask Dr. Mathews a question. In one of the cases I referred to, where the perineum was entirely destroyed, and this inflamed rectal mass was down or protruding, I would like to have him tell us what he would do. I would also like to hear the opinion of other gentlemen on that point.

DR. MATHEWS.—What is the mass, doctor? Is it a prolapse of the entire rectum?

DR. JELKS.—A mass as large as two fists, inflamed, with threatening hemorrhage at any time from the epithelium.

DR. MATHEWS.—My suggestion would be to open the abdomen, draw the rectum and colon up and attach the colon to the abdominal muscle and get rid of the mass.

DR. JELKS.—I wish to say that I have seen Dr. Pennington operate two or three times. In the first place, I desire to pay him as high a compliment as I am competent to pass about his rapid technique, and especially for the tubular speculum he has devised. It has opened up an avenue for work that I never knew before. It will be very valuable, I think.

As to the tampon of Dr. Pennington, and which I saw him use, I would not consider it a tampon when it comes to controlling hemorrhage from a vessel quite as large as the radial artery. I do not know whether you agree with me or not, but I am satisfied I have seen good-sized arteries coming down from the upper portion of a hemorrhoid, and I am afraid to cut and slash around the rectum, without putting a good big tampon in there if I am going to use one at all. I do not believe in using a tampon to control hemorrhage and leave the rectum with a gauze dressing up against it. Anything in the rectum will excite a spasm of the muscles and cause more pain than if you did not have any foreign body in there.

I agree with Dr. Hall, of Kansas City.

To avoid pain, I thoroughly dilate the sphincter before or at the time operation is necessary, and in those cases in which I have failed to dilate the rectum thoroughly, there has always been more or less pain for the first twenty-four hours.

The sphincter would relax and I did not get tormina. Fifteen grains of trional, and one and a half grains of codeine, every four to six hours, will relieve the tormina and pain in these cases.

XIX. INTOLERANT ULCERATION OF THE RECTUM.

BY STERLING B. TAYLOR, M. D.,
COLUMBUS, OHIO.

A review of the surgical anatomy of the anal portion of the rectum is necessary to the complete understanding of the conditions we are about to present. The anus is the external opening of the intestine and in health is tightly closed. The integument surrounding and leading into the orifice is drawn and puckered. This latter condition is due to the continual contraction of the corrugator cutis ani and the external sphincter, which tends to throw the integument into folds radiating from the anus. The former muscle consists of a thin layer of involuntary muscular fibres, radiating around the anus. The internal fibres merge in the submucous tissue of the anal rectum, the external are lost in the integument.

The external sphincter, the more powerful muscle, surrounds the anus, is voluntary, and is attached in front to the center of the perineum, posteriorly to the tip of the coccyx. This muscle is not entirely annular, as we have a decussation of fibres across the median line. The longitudinal muscular layer of the rectum pierces this muscle and is lost in the integument. The relation of the external sphincter interests us very much, since the small portion of the mucous membrane of the rectum lying on its internal surface is within its grasp when it is in a state of contraction; also because the internal border of this muscle reaches the lower border of the internal sphincter, while superficially it is in almost direct contact with the integument. Its deep connections may be briefly summed up as follows; with the internal

sphincter, the levator ani, and on the outside with the fat of the ischio-rectal fossae. It derives its motor and sensory nerve supply from the fourth sacral, especially from the perineal branch, which, after arriving at the tip of the coccyx, passes forward and splits up into filaments, which supply the muscle and integument, and also to its twig through the coccygeal plexus. The pudic and its branches also contribute to the nerve supply. It arises from the second, third and fourth sacral, and its contributing branches are the inferior hemorrhoidal and perineal. Its sympathetic supply is from the inferior mesenteric and the hypogastric plexuses.

We shall consider only the fixed rectum, or the part below the third segment of the sacrum, the only part which can possibly be intelligently explored by digital examination and the specula in general use. The abdominal rectum, or that portion possessing a degree of movement, can not be satisfactorily explored by any other method than ballooning.

The mucous membrane terminates at the anal verge where it joins the integument, and this union is marked by a white line, more or less distinct, sometimes designated the line of Hilton. Where an ulcer which has previously been extra-rectal crosses through this line, then we have an intolerant ulcer of the rectum, which would possibly be best styled an ano-rectal ulcer, not a fissure. This latter term conveys to the mind a cracking open, or interruption of the continuity of the parts, without expressing the presence of ulceration which does exist, and is always evident when it becomes troublesome.

We expect to be criticised by proctologists for the stand we are taking in this paper, but we feel confident that we are on the eve of a complete revolution in the knowledge, nomenclature and treatment of rectal diseases. The recto-anal ulcer (assuming that the major percentage are intolerant, or, to use Gant's term, intolerable) presents the following etiology: Obstipation, constipation, dysentery, diarrhea, foreign bodies, violence, malignant disease, tumors, etc. Habitual constipation, while producing this condition, is later made worse, and sometimes is eventually replaced by obstipation. This latter phase is induced by the accumulation of large masses of fecal matter, which have been retained through

fear of the pain and exhaustion incumbent on defecation. This dried and hardened fecal mass acts as an irritant, and produces an abnormal enlargement of the rectal valves, which hypertrophy acts as an obstruction, to which Dr. T. C. Martin, of Cleveland, was first to call attention. We mention this form of obstruction merely as one of the possible sequellæ of intolerant ulcer. Obstipation from other causes produces the primary rent, when the retained mass has been forcibly expelled.

The acrid nature of the dysenteric and diarrheic discharge is another well known cause. Especially is this true among children, where we have frequently seen anitis, dermatitis, or erythema follow diarrhea. Under the head of foreign bodies there is an endless category, peach stones, buttons, beads, fish bones, pins, pebbles, etc.

An infrequent cause is external violence, such as a blow or fall upon any sharp projection. One case, which may be mentioned in our personal experience, was that of a boy who fell from a considerable height upon a stake, contusing the anal region. This was followed by very severe ulceration.

In early stages of intolerant ulceration, we are inclined to discredit the presence of any severe pain, inasmuch as in its incipiency it is merely a rent or tear in the mucous membrane. This is prevented from healing by the lodgement of small particles of fecal matter, which produce irritation and inflammation and eventually painful ulceration. The extreme pain makes its appearance with the unhealthy granulations. Pain is not the only disagreeable accompaniment, as we often have annoying and sometimes dangerous hemorrhage, especially if the ulcer is located high. The usual seat of the ulcer is at the posterior commissure, and it is here that it is most painful, which may be readily understood from the anatomical arrangement. The anterior commissure is the next favorite seat of our friend, as indeed this affection is the friend of the proctologist, for there is no other rectal or anal disease, producing so much local and far-reaching possibilities, that yields so readily to the slight and painless treatment necessary to its relief and permanent cure.

Much has been written on this subject and the general consensus of opinion is that females are more often affected

than males; that it does not respect age, for it has been noted in the young and in the very aged. Possibly the years from twenty to forty are the most productive, for various reasons, among which especially are occupations requiring sedentary habits. This is also the period in which mankind develops any vicious tendencies.

Further than agreeing that this condition probably antedates Christ, there is much diversity of opinion as to nomenclature, character, and cause of pain, whether it causes sphincteric spasm or vice versa. We are inclined to think the spasm is produced by the irritation of the exposed nerve terminals.

Ball is pleased to say that this condition is frequently produced by the tearing loose of the lateral attachment of an anal valve, which, being continually irritated by the passage of the fecal matter, cannot heal by coaptation, and ulceration ensues.

One authority says, "An ulcer may start as such from the beginning, never at any time having the appearance of a fissure." (Gant.) This is erroneous, we believe, as there must be an abrasion preceding an ulcer, be it ever so slight. Like Gant, we prefer to divide its existence into the first and second stage. The former is characterized by a solution of the continuity of the mucous membrane, followed by irritation and inflammation. It then passes into the second stage, or the period of ulceration. Continual irritation of the ulcer, either by fecal matter or acrid discharges, will increase its sensitiveness, and it will and does induce spasmodic contraction of the sphincter, causing pain that can not be tolerated long without showing remote constitutional symptoms that are alarming to a high degree.

Diagnosis is based on the following subjective and objective symptoms:

Subjective Symptoms. The first indication the patient has of an impending ulcer is the appearance of a drop or two of blood upon the toilet paper, attended with slight, smarting, burning pain. Within forty-eight hours the pain increases in severity with each act of defecation, lasting from a few moments to several hours afterward. A sense of heat is felt more or less constantly, and the burning, tearing, smart-

ing pain is felt only during and after evacuating the bowels. The zenith of the pain is reached when this act has been accomplished. Then it is we get that irregular, forceful contraction of the sphincter. Like the pain of hip-joint disease, it does not confine itself to the site of the lesion, but is referred to near and far structures. The coccyx, perineum, genitals and lower limbs are its seat at times. This may be accounted for by the peculiar nerve supply of the affected part; and our patient has, indeed, an unenviable existence when he has intolerant ulceration combined with coccygodynia. On the other hand, the pain may be at some remote spot, and yet may be accounted for by the presence of an ulcer. For instance, the pain is sometimes referred to the heel or toes. (Gant.)

Taken in connection with the severe pain, the hemorrhage is sometimes alarming to our patient, and it may be so to the medical attendant. Usually there is very little hemorrhage, the stool being marked with streaks of blood only. There may be a copious hemorrhage from an artery whose walls have been destroyed by the ulcerative process. Some pain and hemorrhage may be mistaken for malignant disease; especially is this mistake likely to be made where there is anemia, loss of weight, retention of gases, producing flatulency, and eventually autointoxication.

The symptoms indicated previously may not all be met with at once. As a result of the retained fecal matter, the patient becomes nervous, neurasthenic, loses weight and is merely a shadow of his former self.

Objective Signs. Having previously had your patient free the rectum of any accumulation that might be present, by the use of a glycerine enema, 1½ ounces to the pint, place him in the Sims position and explore the anal field for any malformation or pathological condition present. Place a pledget of cotton over the left thumb, another over index finger of right hand. Catching the superior nates in left palm, make gentle traction upward, while with your right hand place protected finger as near the anal margin as convenient. Order patient to bear down, and if there be a rent or ulcer of the mucous membrane it will be apparent—unless situated high up—showing as a bright red, angry-

appearing ulcer, or as an indolent ulcer, having a grayish deposit on its surface. Search each quadrant well for others, as more than one frequently exists at the same time. Ninety-five per cent. of all patients tell us they are suffering from piles or some other rectal disease. They further state that the pile is exceedingly sensitive on a certain side, thus arming us with an idea of location of the lesion. The so-called sentinel pile is not present in as large a per cent. of cases as some of the older writers would indicate. However, the base of a hemorrhoid is often found to be the seat of an ulcer. The ulcer having been located, the surface should be scraped over lightly with a cotton-covered probe or dull curette to discover its dimensions, previously having injected enough eucaine or cocaine to render the operation painless. Having satisfied yourself as to extent of ulceration, and desiring to search the rectum for further complications, place your patient in the knee-chest posture, examine him with the Martin anascope and proctoscope respectively. By this method you are able to examine the first, second and third chamber with the eye. Necessary for this procedure is position, good reflected light and anesthesia of ulcer. By this method only are you able to make a complete examination of the rectum and anus.

Treatment. The treatment practiced by Martin is simple and effective. No general anesthesia is required; infiltration anesthesia will prove all that is necessary, and is practiced by the injection of a few drops of a one-tenth of one per cent. solution of eucaine or cocaine around the ulcer. Then make slight incision through membrane and integument down to, but not through, the sphincter. Pack with small piece of iodoform gauze. Keep bowels open with some laxative, preferably a mineral water. Apenta water is both pleasant and efficacious.

The pain incident to spasm of sphincter subsides with the operation. Our patient is comfortable during his convalescence, if packed properly, thus insuring healing from the bottom out. Have him call every two or three days; cleanse with sterile water, and if healing is interrupted, pencil wound out with a solution of nitrate of silver, ten grains to the ounce.

If the case has been an aggravated one, immediately after

operation and packing it affords relief sometimes to apply an evaporating lotion on gauze or cotton to the anal region. In these cases sitz baths are to be recommended, also the recumbent posture, avoidance of all exercise or anything that would induce congestion of the hemorrhoidal and pelvic vessels. If the incision has extended into the integument, and the latter heals too fast for the mucous end of the incision, cut it down under eucaine again. Keep unhealthy granulations down with nitrate of silver solution, gauze pack intact, and have your patient massage sphincter once daily with thumb or finger, but preferably with a graduated Kelly or some other conical dilator. The old method of cutting through the sphincter is barbarous, unnecessary, and poor surgery, rendering your patient less thankful, inasmuch as he is left in a pitiable condition.

Complete excision of ulcer may be practiced with little more trouble, but where this operation is performed, much more time is required to secure a complete cure. Gant describes this operation with much brevity and accuracy, pleasing to us all. We would only suggest that this be done under local anesthesia.

We have decided to report five cases, three of which were operated under chloroform, and two under local anesthesia.

Case I.—K. B., age 18 years, female, occupation, housewife; family history good; habits good, except constipation. She consulted us two years ago. History, a chronic constipation, pain and slight hemorrhage on defecation. The pain at times lasted for several hours after the movement. No history was given of any hemorrhoidal tumor. Inspection revealed a tightly contracted anus, and apparently no cause for trouble lay there. Requesting her to bear down, about three-quarters of an inch of membrane was exposed. Beginning about a quarter of an inch above the union of the integument and mucous membrane, located in the posterior commissure, there was an ulcer, granular and highly inflamed. In the left posterior quadrant there was another, smaller and less inflamed. In this case chloroform was given, dilatation practiced, membrane incised through to the muscle, packed with sterile gauze, and after treatment as outlined in case V.

Case II.—Referred to us by Dr. H., name A. D., female, colored, age 34, family history doubtful; history of syphilis denied. Claimed to have been healthy until an attack of

influenza in 1896. At that time she suffered from a severe attack of diarrhea, constipation following ever sincc. Two months prior to our seeing her in the fall of 1898, while straining at stool, she felt "something give". After evacuation, she noticed blood on paper, and felt slight burning pain. After this she did not have a movement for a week, when same conditions existed, only pain was very severe. This continued to grow worse until we saw her. The morning before seeing her, she had an evacuation, and the pain continued throughout the entire day, more or less. Examination showed rather a ragged anus, ulcer located in posterior commissure, large and irregular, presenting a bleeding surface. Dilatation under chloroform, curettement, no incision made. Never saw patient again, but was told by her physician that she recovered without any further treatment.

CASE III.—E. M., printer, age 31, habits and family history good; in health weighing 190 pounds; pain on defecation, bloody mucous discharge. After stool, pain lasted sometimes nearly all day. He feared cancer. Weight reduced to 160 pounds. Condition covered period of thirty-one weeks; insomnia present, and extreme despondency. Ulcers were located at the anterior and posterior commissure, the one posterior, deep, red and angry. The tear had been elliptical. The ulcer in the anterior commissure was covered with a grayish pink film. Chloroformed, dilated and incised membrane and integument, dividing some of the superficial fibres of the sphincter, packed with gauze. Recovery slow. In fifth week, another division of integumentary end of posterior commissural wound was necessary. Total time consumed in cure seven weeks. We neglected to state in this case that there was some proctitis, which was relieved by enemas of boracic acid solution.

CASE IV.—Presented by Dr. M., was not rare, but afforded the patient the usual train of symptoms. Prior to consultation with Dr. M., Mr. H. called upon another local physician of high attainment; stated his symptoms clearly, and was told he had hemorrhoids. He was prescribed for, and left to suffer without even the form of an examination. Getting no better, he consulted our friend; was examined and case properly diagnosed; was referred to us, and operated on under a local anesthetic. Ulcer was incised through to the muscle, and packed. Cure perfect in three weeks.

CASE V., and last we desire to report, presented the usual symptoms. Operated three weeks ago under cocaine. Patient is well now. Never any pain after injection of the anesthetic. This was our initial experience with the cocaine infiltration method. However, it has been our pleasure to

see in the practice of our friend Martin, of Cleveland, some aggravated cases operated under cocaine with excellent results. Our practice has always been to cleanse wound on second day after operation, and every other day thereafter with sterile water, wiping it out carefully with small cotton sponge, repack with a sliver of iodoform or sterile gauze. Where the wound needed stimulation, a three or five grain solution of nitrate of silver was freely applied.

DISCUSSION.

Dr. Thomas Charles Martin, of Cleveland, Ohio.—I desire to add a word or two to what Dr. Taylor has already said, to emphasize the value of the procedure. The conventional operation for painful anal ulcer is to anesthetize the patient completely, stretch the sphincter, and cut through it. Such an operation is unnecessary, is barbarous, and is hazardous, perhaps, to the life of the patient, as well as to the function of the rectum. The pain in dealing with this small lesion subsides with the beginning of the operation. The infiltration method of anesthesia by the use of eucaine is to be employed, the ulcer cut through, whether it be one form of fissure or another, and there are a great variety of fissures. The pain subsides at once; there is no danger whatever to the life of the patient or the function of the sphincter. The patient need not be confined to his house; he may go about his business; the operation may be performed in the office of the physician.

Dr. Taylor (closing the discussion).—I have very little to say. Saturday morning, before leaving home, I incised an anal ulcer under eucaine and the operation was painless.

XX. MODERN SURGICAL TREATMENT OF HEMORRHOIDS.

BY GUSTAVUS M. BLECH, M. D.,
CHICAGO, ILL.

The many methods recommended in literature for the relief of hemorrhoids show that either none of them is perfect, or that one method does not fit all cases.

It must not be forgotten that no treatment is scientific or rational if not based on the etiology and pathology of a given case, and that these vary in various individuals.

The simple diagnosis, "hemorrhoidal tumors", says little, if anything, when a method of treatment is to be decided upon. As is well known, the clinical picture of each case, the number and size of the tumors and their location are all features with which the physician or surgeon must become familiar ere he can decide how to proceed therapeutically.

An exhaustive scientific study of the etiology and pathology of hemorrhoids would require volumes, and as I am sure that it is not *terra incognita* to most members of the medical profession, a few remarks will have to suffice.

Modern pathology teaches that there can be no inflammation without germ infection. That seems to be a surgical axiom, and certainly we have no right to decry this theory, which could be disproved only by careful experimental research, something that, to my knowledge, at least, has not been done so far. Since a hemorrhoidal tumor is but the result of an inflammatory process, germ infection must be the main etiologic factor.

A *locus minoris resistentiæ* is produced by certain mechanical influences, which, however, in the light of modern pathology, can be considered only as predisposing causes. In this class belong straining during defecation, obstruction of the portal vessels from liver disease and abdominal tumors, pressure produced by gravid uterus, pressure on the veins from impacted feces, etc.

On the whole, however, our knowledge of the causes of piles is very meager, and it seems to me that pathologists will find here a rich field for investigation. That germs are primary factors in the production of hemorrhoids I am satisfied from a simple observation in my practice, namely: when I see a case of incipient piles, that is to say, when tumors have not yet become so large as to resist local measures, non-surgical in character, with a view of producing retrogression, the application of suitable antiseptics has in most cases produced a complete cure after ten or twelve days' treatment. In such cases I am in the habit of irrigating the entire rectum with a hot 2 per cent. solution of antinosin once a day, and to leave a tampon of cotton saturated with glycozone for several hours every day. In such cases I never practice dilatation, for in eighteen cases of complete dilatation under chloroform anesthesia not one cure resulted, the patient complaining of "piles" weeks after the operation just as much as before.

Eighteen failures led me to the belief that dilatation is of no value whatever even in small piles, no matter whether internal or external. I would recommend in such cases that the local treatment with good but non-toxic antiseptics be given a fair trial. It is hardly necessary for me to mention that attention must also be paid to the possible removal of mechanical disturbing influences.

When we are called upon to treat larger tumors, no matter whether external or internal, we must know what method of operation to employ. There are several of them. One thing is certain, and that is, the tumor must be removed. This, however, can not be accomplished in a manner so frequently practiced for the removal of a polypus of the nose, for instance, where simple cutting off or twisting suffices. Were we to adopt the same simple method for the removal of hemorrhoids, the extirpation of these growths would be followed by a number of unpleasant symptoms, if not by contraction and stricture of the rectal walls.

The patients, for reasons unknown to me, seem to have a horror of operations of the rectum, which explains why quacks, advertising to cure piles without a knife, are doing such a large business. Little do the patients know how

they are victimized and how even their lives are subject to danger. I refer to the treatment that is popularly known as the injection method; that is to say, escharotic solutions are injected into the tumors by means of a hypodermic syringe and the tumors made to disappear by a process of sloughing. It can not be denied that a good many cures have been accomplished by this method, but it must also be remembered that such accidents, if accidents they can be called, as phlebitis, ulceration and fistula may make the patient worse than before, while thrombosis, which indeed is very apt to occur, kills and has killed a good many.

To risk the patient's life for the sake of a small fee, no true surgeon will undertake. Popular opinion is in favor of this method, but to-day the "specialist for chills" is preferred to the scientific practitioner, the "herb doctor" to the surgeon. I also know that the injection method is not always followed by permanent results, the tumor under certain conditions growing again.

I was not long ago consulted by a very prominent clergyman of New York, who has undergone a good many treatments by the injection method, and who has to go back again. The suggestion to have his tumors removed with a ligature was rejected as being an operation, all arguments proving of no avail; but rectal surgeons are in this respect no less unfortunate than gynecologists, women preferring to idle away time, sometimes precious time, with electric treatments, pessaries and applications, whatever they may mean, when a simple operation like curettage would relieve them of their suffering.

In the earlier years of my professional career I was in the habit of removing internal and external hemorrhoids with the écraseur. It was one of my favorite operations for a long time, because of the easy way it could be executed. My objection at present to this method can be framed in the following:

1. The wire of the instrument is very apt to break, leaving the operator in a dilemma, especially when the operation is half done.

2. The cut surface is neither accurate, even, nor can it be regulated. No matter how close we keep the wires down to

the base, it is the écraseur which cuts as it pleases, not as we want it.

8. It frequently happens that, after the operation is completed, complete separation of the tissues does not take place, and if the screw is tightened some tissue is drawn into the stem, and, if continued, the stem is apt to bore itself into the rectal wall. Personally, I leave the écraseur now to the laryngologist.

For the operation known as excision, Mr. Walter Whitehead, of Manchester, England, is responsible. Of course, the operation must be styled after the inventor, hence it is also known as Whitehead's operation.

On another occasion I said that the desire to gain notoriety drives men to "invent" or "modify" instruments or methods which are of no importance whatever.

When the modification consists in grasping a needle between the small fingers of both hands, or in tying thrice instead of twice, or in using cat-gut instead of silk, I would pass over such modifications with a smile; but when one invents a Whitehead operation, it is time to call a halt. His operation consists of a radical excision, not only of each hemorrhoidal tumor, but of the entire hemorrhoidal plexus. The operation itself is a bloody one, and secondary hemorrhage is always to be feared. It requires a good deal of time to execute it, recovery (union) takes place slowly, and it is adapted only to a limited class of tumors. Whoever wants to enjoy real cutting and butchering should study his method, described in the *British Medical Journal* (February, 1887). We prefer not to waste any time copying the same, nor is it in accord with the dignity of the subject to pay any attention to the treatment of hemorrhoids with chemical caustics.

There remain to be considered but two surgical methods, viz.: The treatment with clamp and cautery, and the operation by ligature. Both are comparatively easy operations, as far as the technique is concerned. Many eminent surgeons prefer one to the other, but on the whole, opinion is equally divided, and only individual experience will be decisive to the individual operator. Personally, I am entirely unbiased, but must admit that I have never operated with clamp and

cautery. The reasons for this neglect are of a double nature.

First, it is well known that even the best thermo or galvano-cautery outfit occasionally refuses to work at moments when most needed. My second objection being of an economic nature, the expense for the outfit being very large, an item which, while not strictly scientific, is one seriously considered by surgeons of limited means.

My method of operating for internal hemorrhoids differs but little from the one in vogue with most surgeons. A few days prior to the operation, the patient is treated with mild laxatives. A bath is ordered prior to the operation, and the parts shaven. Two ounces of a 10 per cent. solution of hydrozone are thrown into the rectum, nascent oxygen being formed by the contact of the drug with the diseased membrane. I allow the solution to remain while foaming about a minute, and then irrigate the entire rectum with a 2 per cent. solution of antinosin. I have then my field of operation in an aseptic condition. Preparation of instruments and hands is made in the usual manner. In all cases where the surgeon has been attending a septic case or operation on pus, carcinoma or similar affections, it would be advisable to slip over the hands a pair of sterilized rubber gloves.

A good dilator is now introduced to expose the tumors, which can be easily grasped with a volsellum forceps and held by an assistant or nurse. It is better to start with the smaller tumors, leaving the largest for the last.

Under no circumstances should the tumor be dissected up at its base, as suggested by Allingham. Where we have to deal with one or two tumors, this procedure might not be followed by ill results; but where there are many together, particularly when the tumors surround the anus like hills in a natural fortification, stricture of the anus has been known to occur.

I don't make any dissection at all, but following Mathews' method, simply nick with a sharp bistoury enough around the base of the tumor or sulcus to permit the lodging of a strong silk thread. A straight, threaded needle is then passed through the base, the needle removed, and each side tied carefully, so as to produce strangulation of both halves of the

tumor. The silk is tied when fitting into the line of incision. Two-thirds of the tumor (from above) is cut off with a sharp straight scissors. The field of operation is again irrigated with a 2 per cent. solution of antinosin, followed by a douche with a normal saline solution. The wounds are dusted with nosophen and a pad of gauze placed over the anus and secured by a bandage.

If I have to remove but one tumor of large size, I simply throw around its base a temporary ligature, cut off the entire tumor, and then sew the wound together in the direction of the axis of the rectum with interrupted sutures.

DISCUSSION.

Dr. F. F. Bryan, of Georgetown, Ky.—I have listened with interest to this paper, in which the author has given us the views held on this subject, and I only wish to say that I have operated with clamp and cautery as well as with the ligature. As has been said, both have a field of usefulness. The objection I have heard against the ligature is that patients expect and are anxious for the ligature to come away. Operating by the clamp and cautery is a more popular method, and I would advise its use in every instance where there are no contraindications. In my own experience I have not run across any contraindications since I have been using them. I used the ligature in my earlier days of practice.

Dr. John L. Jelks, of Memphis, Tenn.—In reference to a point brought out, the doctor must have thought from my paper that there were a number of complications that might result at the time one operates for hemorrhoids. That is not true. I very seldom have severe complications after an operation for hemorrhoids, and my patients do not have the pain that he speaks of. From what I have heard and seen, there is no more pain following the use of the clamp and cautery than after the ligature. In the last patient I operated on with the ligature, I asked the patient (a man) in the presence of another physician whether he experienced any pain, and he said none excepting during the first day, when there was a little burning and stinging. If the rectum is not thoroughly dilated, these patients will complain of some pain, especially if there be a mass in the rectum to create tormina.

So far as hemorrhage is concerned, I never have it after the application of the ligature.

DR. BLECH (closing the discussion). —I quite agree with Dr. Jelks as to the painlessness of the ligature method of treatment, as well as the treatment by the thermo-cautery. My experience has not been as extensive as that of Dr. Mathews, or as that of Dr. Ochsner. I sometimes am at a loss to know why the profession is so divided in regard to the use of clamp and cautery and ligature. There is almost the same difference as there is between two political parties. In my experience it is simply this, that it is a difficult thing to purchase a good galvano-cautery or a good Paquelin, and the instrument-makers themselves tell us that they are unreliable. I saw Von Bergmann operate for hemorrhoids and the Paquelin gave away, delaying the operation for twenty minutes.

Speaking of pain, I have seen patients complain bitterly of it after treatment of hemorrhoids with the thermo-cautery, so much so that it became necessary to introduce suppositories of morphine to afford relief.

The ligature method is a simple one unless we have a mass to deal with, when it is difficult to exsect it properly. In my cases I have only observed a little pain or a little burning sensation afterwards. By dusting over the wound a powdered antiseptic, like nosophen, which has slight anesthetic properties, my results have been favorable in the last twenty-one or twenty-two cases.

XXI. A PNEUMATIC SIGMOIDOSCOPE.

BY WILLIAM V. LAWS, M. D.,
OF PHILADELPHIA.

Having been especially interested in the study of rectal diseases for several years, I have frequently felt the need of some means by which the upper rectum, sigmoid and colon could be examined thoroughly, and at the same time with safety. The instruments in established use have in my hands proved very unsatisfactory. Not being able to eliminate the element of danger incidental to the introduction of the long sigmoidoscopes, I have been very chary in the use of them. Such instruments are dangerous in any but expert hands, and even then accidents have been reported, especially when there is coexisting disease of the upper bowel.

To overcome the objections to the long instruments, I have devised a pneumatic sigmoidoscope, which I believe is unique in several respects. It consists of a simple tubular speculum, 7 inches in length, with a screw-cap fitted with plate glass over the proximal end; two electrodes run through the handle of the instrument, so as to connect a 5-candle-power electric light, which is placed a short distance from the end of and within the tube; just in front of the glass cap there is a small opening in the tube, so arranged that the rubber tubing of a double air-bulb may be attached. It is also furnished with an obturator.

The obturator being placed in position, the instrument is introduced into the rectum for 2 or 3 inches; the obturator is now removed, and the electric lamp put into place; the glass cap is tightened, and then by gradually pumping in air by means of the bulb, the whole upper part of the rectum and sigmoid flexure will be inflated; now, by turning on the electric current, the interior of the bowel is illuminated, and can be thoroughly examined.

If the lower part of the rectum is to be examined, a finger-cot may be slipped over the end of the tube, and held in place by means of a ring; when the finger-cot is inflated, it becomes transparent, and, at the same time, dilates the rectum, so that every part of it can be seen.

The handpiece which contains the electrical connections is made interchangeable, so that any size or length tube may be used. The practical set consists of three tubes, 20, 25, 30 mm. in diameter respectively, and 18 cm. in length. Yet a much shorter, or a tube as long as 36 cm., may be attached, if found necessary. The obturator handle is made so that any size tip may be screwed on, and by means of a telescopic arrangement it may be adapted to fit any of the various tubes described.

A special screw-cap with a smaller glass window, and an air-tight valve arrangement, which will allow a curette, a probe for making local applications, an electric cautery snare, a spray apparatus, etc., to be used while the bowel remains inflated and perfectly illuminated, is another one of the possibilities of the instrument.

I have also devised an air-tight telescoping connection, by

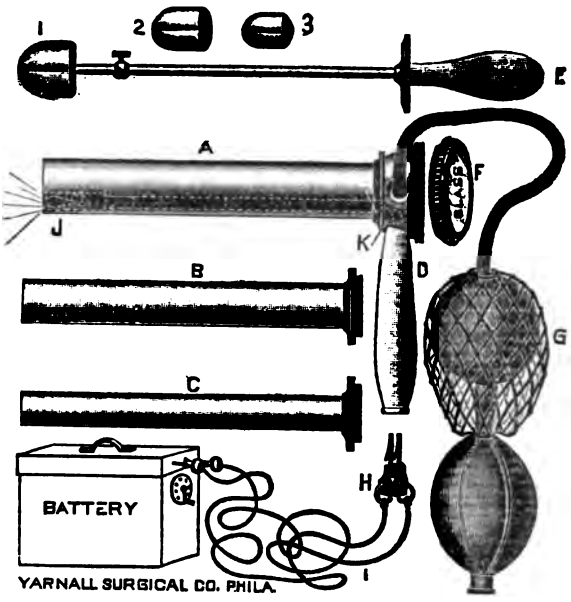
means of which an ordinary camera may be attached to the instrument, so that a photograph of any growth or lesion of the rectum or sigmoid flexure may be made *in situ*.

The patient should be placed in the knee-chest position, in order to facilitate the dilatation of the parts. It is not necessary to give an anesthetic, as the use of the instrument does not cause much pain. A pad of cotton wrung out of water, and held closely around the tube, and against the anus by an assistant, will keep the air confined in the rectum, or an inflated rubber pessary slipped over the tube will answer the purpose as well.

I noticed in last Saturday's issue of the *Journal of the American Medical Association* an article by J. Rawson Pennington, M. D., describing an inflating rectal speculum that is similar to my unimproved sigmoidoscope, consisting of the tubular speculum, glass cap and inflating bulb. I have had that much of my instrument, with the addition of the electric light attachment in use at the Medico-Chirurgical Hospital, Philadelphia, for nearly a year, not being willing to give it to the profession in an incomplete state. I now wish to show clearly that I have been using practically the same instrument described and published by Doctor Pennington nearly a year before the September 30, '99, issue of the *Journal of the American Medical Association*. I can prove it by various persons connected with the Medico-Chirurgical College and Hospital, and will now mention the names of two gentlemen well known to the Mississippi Valley Medical Association and the profession at large. I refer to Prof. Joseph M. Mathews, of Louisville, Ky., who on account of illness in his family passed several weeks in Philadelphia during February, 1899, and was frequently in my office during that time, and knew of the different steps I had taken in perfecting the instrument. All of this is even better known by my office associate, Prof. William L. Rodman. Before either of these gentlemen saw my instrument it was seen and examined by Major David C. Peyton, of the United States Army, who was stationed at that time in Philadelphia, and was living at No. 1703 Walnut street, where I also resided.

All of these gentlemen, who are warm personal friends of mine, did not hesitate to speak of my unimproved instru-

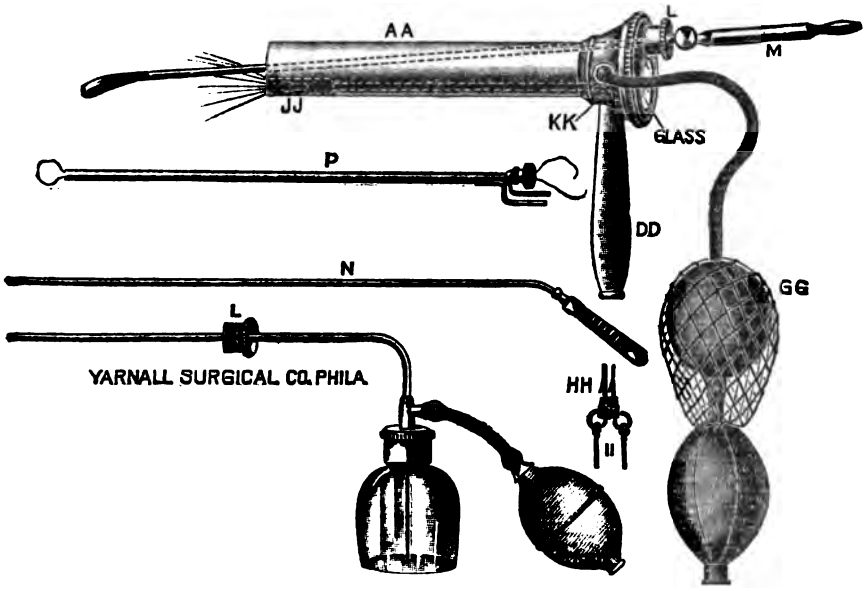
ment, as they believed it filled a distinct want in rectal surgery. I made no secret of what I was doing, nor did any of my friends who saw the instrument. I feel that I can very well dismiss the question of Doctor Pennington's priority, inasmuch as his instrument at the most is inferior to my crude instrument, which I was unwilling to give to the profession; his instrument has no electric light; mine had from the first, and by reason of it I saw possibilities in the direction of photography and treatment of neoplasms and



A, B, and C, detachable tubes, 20, 25, 30 mm. in diameter, 18 cm. long. D, handpiece containing electrodes K. F, screw-cap, fitted with plate glass. G, double air bulb. H and I, connection and cords of battery. E, extension obturator. J, 5-candle-power electric lamp.

lesions of the bowel *in situ*. Therefore, my instrument is not only of value for diagnostic, but therapeutic purposes as well. I feel, to conclude, that the unfortunate delay in publishing the results of my first labors in this direction has been more than atoned for by the betterment of my instrument in every way. In its present and, I trust, perfected state it has already proved of great value to Prof. Rodman

and myself in ward class demonstrations to the students of the Medico-Chirurgical College. We have shown tumors of the sigmoid with perfect distinctness as to size, shape, and color, general appearance, etc., and I am, therefore, led to hope that it may have a fair trial by those doing rectal surgery.



AA, tube, 30 mm. diameter; 18 cm. long. JJ and KK, electric lamp and electrodes. L, air tight valve. DD, handpiece. GG, air bulbs. HH and II, cords and connections. M, curette; P, electric cautery snare; N, probe; O spray apparatus.

DISCUSSION.

Dr. J. R. Pennington, of Chicago.—I have been very much interested in the description of the instrument presented by Dr. Laws, and I rise to speak of it for the reason that I am told that Dr. Laws felt very much aggrieved because one week ago I published in the *Journal of the American Medical Association* a rectal speculum for inflating the bowel, which had a screw-cap the same as this instrument, and I think his instruments—anoscope, proctoscope, and the long sigmoidoscope—all contain a screw-cap, also the contrivance for inflating the bowel. The doctor telegraphed that I had purloined his instrument. I want to say to the members of the Section that I did not do anything of the kind. I never

saw the instrument, never heard of it, and knew nothing about it until its presentation this morning. It is possible for men who are working in the same field to make similar discoveries at the same time, and I feel quite sure that that is true in this case. It would be better in cases of this kind for practitioners to correspond with one another to avoid unpleasantness whenever there is a possibility of two men inventing the same device or instrument.

Speaking of the instrument itself, I should regard the rubber bulb as useless, as well as dangerous. We should remember that in dealing with the bowel we have a thin tube, and when it is diseased or ulcerated to any great extent there is danger of rupturing it by this instrument because of impaction of feces incident to constipation or obstipation. Whenever you introduce an instrument of sufficiently large size, with the sphincter muscle grasped around it, you put the patient in a dangerous position. In the first place, whenever you force air through the rectum and all the way to the cecum you distend the bowel until you give the patient severe pain. I regard the rubber bulb therefore as dangerous.

So far as the photograph is concerned, it has nothing to do with my instrument. I have an electric light in my instrument, so that when the bowel is inflated, through the glass I can see plainly into the bowel.

Dr. Thomas Charles Martin, of Cleveland, O.—I have been very much interested in the exhibition and presentation of these instruments. The rectum has been a dark continent for ages. While I have no doubt that with this method the rectum can be illuminated; at the same time, it steers us away from it. If the patient is put in the knee-chest posture, no artificial apparatus or means at all are necessary for the inflation of the bowel, provided a tubular or other instrument be used which opens up the anus. There are a few exceptions to this, however. One class of exceptions can not be overcome. I refer here to tubular strictures, to rectal growths which permanently contract the lumen of the rectum or sigmoid flexure. Other exceptions are those due to congestion of the rectal mucous membrane, or to hypertrophic rectitis. This condition may be overcome by spraying the rectum with a 4 per cent. solution of cocaine. This produces such action on the rectal wall as to cause spontaneous inflation of the bowel.

Dr. Joseph M. Mathews, of Louisville, Ky.—Two years ago I heard a gentleman in Kentucky say to another gentleman, who was working in the field of rectal diseases, that he

could see farther "into the subject" than any other man he had ever heard talk. Dr. Laws goes him one better and sees a little farther. About eight months ago, while I was in Philadelphia, Dr. Laws' instrument-maker showed me this instrument. In the first place, I asked Dr. Laws if in inflating the rectum and colon the instrument would not induce great pain. I believed that it would. But facts are facts. The doctor has used it a number of times and tells us that it does not produce great pain; therefore that objection is overcome. As a rule, I am opposed to any instruments in examinations of the rectum. I have always maintained that the finger is the best instrument that can be used in detecting growths in the rectum. But I do see a field for this instrument. It is very well to *look* at an ulceration or neoplasm, or whatever you may find there, and if this instrument accomplishes that, it does a great deal for the general, as well as special, surgeon.

In my few remarks I shall contrast it to the instrument used by my friend Dr. Kelly. I do believe, as Dr. Laws says, that it is a dangerous thing to put a solid metal instrument up into the colon. I have cited before the fact that a gentleman in good health, thirty years of age, was killed by the introduction of this kind of instrument. We can conceive that in a gut, especially one where we have a pathological condition, such an instrument might be pushed on through into the peritoneal cavity. A second objection to Dr. Kelly's instrument is that after you have succeeded in introducing it into the colon or sigmoid flexure, you only see a very limited area. Now, if Dr. Laws can inflate the sigmoid flexure and with his light see the entire rectum, it is certainly a better instrument than Dr. Kelly's. Therefore, I want to commend both Dr. Pennington and Dr. Laws for their investigations of this subject. When they shall have perfected their instruments, it will aid us materially in searching out obscure troubles of the rectum; therefore I am more than pleased to have heard statements by these two gentlemen of new instruments along this line.

Dr. R. E. Haughton, of Richmond, Ind.—I am very much interested in this matter and in this instrument, for the reason that it strikes me as being practical. The same objection that has been urged against it as an element of danger might have been urged against the use of a microscope, or a telescope for examining the heavenly bodies. In many cases I can conceive where an instrument like this would greatly aid us. I was once in great doubt about a case as to just what to do, because I did not have such

an instrument as this at hand. A lady came to me a long time ago with a neoplasm. She was about to die from a hemorrhage which took place from the bowel. I made an examination per vaginam, but had to go further and look for its source. I knew there was a neoplasm, but could not determine its character, and what to do with it was a question. At first I thought I would cast a loop wire ligature about the neoplasm and remove it in that way, then I thought if I attempted to do this I would make a greater mistake, that is, drawing in so much of the mucous membrane in the wire loop and cutting entirely through it, which would make a hole in the bowel. I did not do it. I concluded that the only thing to do was to make an incision across the neoplasm and enucleate it out of its bed. I knew I was in a tight place. Some of you know what that means. However, I enucleated the neoplasm without determining the exact character of it, and my patient recovered. I want to say here that we can not always do that. If I had had this instrument at the time I can comprehend what kind of investigation I could have made; I should have known what to do in removing it safely for my patient as well as myself.

There is an advantage in working along these lines of invention, and if we wish to be conservative, let us be conservative on right lines as to the safety of the patient as well as of ourselves. I am a conservative man in my methods, and yet I have the courage of my conviction when it comes to a case like the one mentioned.

Dr. Sterling B. Taylor, of Columbus, O.—In the new edition of "Gray's Anatomy" it is stated that the rectal valve prevents an intelligent digital examination of the rectum. By the anterior proctoscope shown this morning, and by the Martin proctoscope, we can examine the rectum and the sigmoid flexure painlessly and intelligently. I know that it is painless, because it has been practiced on myself two or three times. I believe what the two speakers have told us, because I have seen it myself, and seeing is believing. In the second place, I do not believe that artificial means of dilatation is necessary, but with the Martin posture (the knee-chest position), you get a spontaneous ballooning which will remain, and it is necessary, in order to make a complete examination, to have a good reflected light and nothing to interrupt the field of operation in cutting or exploring the neoplasm.

Dr. John L. Jelks, of Memphis, Tenn.—With reference to digital examinations of the rectum, I have never been able

to make an intelligent digital rectal examination and discover what there might be in the rectum. I have examined a few rectums, and some men may be able to find high up in the bowel a little sinus leading from the ischio-rectal fossa, or from the peri-rectal space, etc. Some men may be able to do that and discover a minute opening, but I can not do so. I have never been able to detect such a condition of affairs without a speculum, and certainly the instruments that have been exhibited are valuable in the examination of such cases. They are valuable when it comes to examining a rectum in which there is supposed to be some malignant neoplasm, but when it comes to the surgical part of it, they are worthless, so far as I can see. You can split one of the rectal folds, but you can not remove a large neoplasm through an instrument like this. You may burn sections of it off with the thermo-cautery. As an illustration of examination by illumination or by dilating the bowel with air, a patient was brought to me by a physician who had examined him two or three times with a speculum and with his finger. I made an examination with my finger first, and then with a speculum, and I did not find anything except one or two ulcers. I treated him, and three days thereafter he came to my office, when, after an examination with the speculum in the right direction, away up between the blades of the instrument I discovered a little pus oozing from the wall of the gut high up. Could it have been discovered by the finger? I say no. I introduced a long, curved probe into the abscess cavity, pulled it down, and the cavity was as large as a hen's egg. Such a condition could have not been diagnosticated with the finger, and it may not have been diagnosticated easily with an instrument like that exhibited by Dr. Laws. I believe the instruments of both gentlemen are worthy of great praise, and I do not think there should be any disagreement between them as to the matter of priority.

Dr. Laws (closing the discussion).—I am very much surprised to hear Dr. Pennington say that the rubber ring or bulb attached to the instrument is of no use. Especially am I surprised, knowing that he lives here in Chicago, where the so-called American operation has been done to a great extent for so long a time. The reason for this rubber ring is this: A patient presented himself for examination who had undergone the so-called American operation, consequently he did not have a sphincter muscle, and I had to contrive something to take the place of this muscle.

With reference to the point made by Dr. Pennington, that it is dangerous, I say it is not, for the reason that we

can see what we are doing. If we inflate the rectum by pumping air into it to see what is taking place in the bowel, with illumination we can see the parts dilate, and wherever it is necessary to give an anesthetic it can be done; consequently it is not dangerous to confine air in the bowel. If you do not confine the air, what happens? It escapes; and so much air is not required to be pumped in. That is all the difference in it, because if you start in to dilate the rectum and sigmoid flexure, you will succeed. I do not think that the doctor's point is well taken.

In regard to the magnifying appliance that Dr. Pennington referred to, I have examined no less than a dozen cases with this instrument, and I have had no trouble, and two or three neoplasms were located all the way from four to seven inches up the bowel. I have had no trouble at all in seeing a neoplasm as plainly as I can see the nose on a man's face. I do not see, therefore, any necessity for a magnifying apparatus.

I have noticed that Dr. Pennington has an article in the last issue of the *Journal of the American Medical Association* in regard to inflating the bowel with a rectal speculum. It is a tubular speculum with glass cap and bulb. He does not say anything in his article in regard to illumination except by reflected light. This light, you can readily see, is not as satisfactory as the electric light close to the bowel you are examining. I have had my instrument, with inflated bulb and, in addition, electric light in the bowel, without the other means, and have made use of it in the Medico-Chirurgical Hospital, in Philadelphia, for nearly a year. As Dr. Mathews has said in his remarks, an instrument-maker showed it to him about eight months ago, and he tells me that he has spoken to a number of physicians about the utility of my instrument. Dr. W. L. Rodman and about twenty-five other physicians will testify to the accuracy of my statement.

As to the matter of priority and superiority of my instruments, I am quite content to let the profession estimate their merit.

XXII. THE MASTOID OPERATION.

REPORT OF CASES.

BY GEORGE F. KEIPER, A. M., M. D.,
LAFAYETTE, IND.

So much has been written upon the mastoid process and operation during the past few years that the subject is familiar to the profession generally. Therefore, no attempt will be made in this paper to enter into the etiology, diagnosis or treatment of mastoiditis, all of which may be found in the latest text-books on diseases of the ear. However, some points in the operative procedure need to be noticed more carefully than in the past. Therefore it affords the writer much pleasure to refer his readers to an article upon "The Facial Nerve in its Relations to the Aurist", by my friend, Dr. George L. Richards, of Fall River, Mass. This article appeared in the May number of the *Annals of Otology, Rhinology and Laryngology*. Therein particular attention is directed to the possible injury to the facial nerve in operative work either upon the mastoid or the middle ear. The article is timely, for we have really been reckless and our patients have suffered. Now, if the facial nerve be wounded or severed, all authorities agree that it can not be regenerated in less time than from twelve months to two years, if regenerated at all; hence the importance of taking due notice of its presence in operative work. However, wounding of the nerve is liable to take place, notwithstanding every precaution that we may take. The last case operated upon by the writer shows partial facial paralysis, because, as the writer firmly believes, the facial nerve was misplaced. The case will be referred to later.

The first case to be mentioned is that of Mrs. Geo. M., who was seen by me at the advice of her family physician, Dr. J. C. Webster, February 27, 1899. The right mastoid presented all the symptoms of acute inflammation of the bone. The ear was discharging pus freely. Heat was ordered applied continuously by the Japanese pocket stove. This gave

relief from the pain, which our patient had suffered continually. She seemed to progress well, until about 12:30 on the morning of March 4th, when we were hastily called and found her much worse. Feeling that the case warranted no delay, she was as soon as possible taken to St. Elizabeth Hospital, and at 10 o'clock, with the assistance of Drs. Webster, Hope, Hopper, Davidson and Throckmorton, the mastoid was opened, all carious bone removed, the wound left open, but packed from the bottom with bichloride gauze. The recovery was uninterrupted, and at no time did the temperature rise above 100° F. The discharge from the ear ceased promptly. One feature of this case is the fact that on the fifth day after the operation the temperature became subnormal, going down to 97.2° F. This happened several times thereafter, but no untoward results followed, and what at first caused some anxiety was really no cause for alarm. The patient was very bright at these particular times when the temperature was subnormal; the pulse was normal in all respects. She left the hospital at the end of the month thoroughly well, having made a perfect recovery. She also possesses a fair amount of hearing in that ear.

Case No. II is that of J. L., referred by Dr. A. D. Pyke, of Romney, Ind. He was seen at the office on March 1st, suffering with acute mastoiditis of the left side. The left ear was discharging pus. He was advised to go into the hospital immediately, which advice he refused, until he could consult with his wife. The continuous application of heat by the Japanese pocket stove was ordered, together with quinine and iron, internally. He returned to the city March 4th, and immediately went to bed at his uncle's house. Being called there the same afternoon, he was found with the mastoid tender, and a temperature of 101° F. The pain was frightful and only relieved by the hypodermatic injection of ¼ grain of morphine, repeated again after a short interval. Operation was advised. He hesitated and desired farther time for consideration. At 9 p. m., he sent word that he desired the operation. The ambulance was called immediately, and through a heavy snow-storm he was taken to St. Elizabeth Hospital, and arrived there none the worse for the exposure which he had endured. At 9 o'clock on the morning of March 5, 1899, with the assistance of Drs. Hopper, McMahon, Westfall, Beasley, Smith and Davidson, the mastoid was opened. The writer prefers to open the bone with a quarter-inch trephine, placed so that the upper margin of the hole is just below a line drawn horizontal and tangent to the upper wall of the bony meatus. The bit of the instrument had sunk but a little way when pus in great quantity began to

well up. The button of bone was knocked loose by the mallet and chisel, and the operation completed without incident. Now this patient was very much concerned, all the time that he was in the hospital, about his new farm, to be absent from which was awful in his estimation. He worried very much, and when he worried the most his temperature would go up to 101° F. On March 12th, after the temperature had been normal for a couple of days, the temperature shot up to 101.4° F., and to 103° F., at 11 o'clock p. m. The wound was immediately opened. It looked as if an attack of erysipelas was pending. The packing was immediately replaced with new gauze wet with a saturated solution of hyposulphite of soda. The bowels were ordered opened by calomel, repeated frequently in small doses. Quinine and salol were given internally. However, all symptoms suspicious of erysipelas disappeared and he made an uninterrupted recovery.

CASE III presents some interesting features in the person of Mrs. John M., age 66, an inmate of the Indiana State Soldiers' Home. She had been suffering with mastoiditis for six weeks, refusing an operation. She was brought to St. Elizabeth Hospital in an exhausted condition. After examination, operation was decided on as her only chance for recovery. However, her condition was so bad that an unfavorable prognosis was given, even with operation. After making the customary incision, it was found that the cortex of the mastoid was a mass of broken-down bone filled with pus and choleosteatomatous masses, which needed only a scoop to clear it all out. The chisel and gouge were not used at all. The patient was put to bed. She suffered much pain which had to be controlled by frequent hypodermatic injections of morphia sulphate. For two weeks she hung between life and death. The wound was dressed every day, but it showed no signs of vitality. Then there was present a cadaveric odor, implying early dissolution. When this appeared I asked for counsel to take charge of her general condition, and Dr. Geo. F. Beasley, consulting surgeon of the Indiana State Soldiers' Home, was called. He ordered the colon flushed out frequently with high injections of lysol in water, with the happy result of finding the cadaveric odor disappearing, and the patient's vitality improving. The former septic absorption from the bowels was thus prevented. As soon as the vitality of our patient began to improve the wound began to show signs of granulating and filling up. The intervention of Dr. Beasley saved our patient's life, for after this treatment she began to mend, though very slowly, and to-day she is enjoying health such as she never had before. One point was made manifest

in the treatment of this case. It is this: If the bowels can be kept in as perfect a condition as possible after a mastoid operation, the temperature will not be hard to control. After each flushing the temperature would drop, to gradually increase until the time should arrive for another high injection. Here we had a very plain case of autointoxication.

CASE IV is Mrs. Patrick C., age 41, of Fowler, Ind., referred by Drs. J. S. and D. E. Mavity. For some time she had been suffering with all the symptoms of mastoiditis, which all the ordinary means failed to control. She came March 11, 1899, and the symptoms of mastoiditis were not well marked. In fact, it seemed doubtful if it were present. However, by March 15th we made up our minds, from the two symptoms to which Dench draws particular attention, that she should have the benefit of an operation. So, on March 15th, the mastoid was opened, and we found a case of osteitis present as the result of the previous inflammation. The bone was as hard as ivory and the operation with the chisel and mallet was very slow and tedious. Within this necrosed bone small foci of caries were present, which were removed. For years before she had poor health, and on that account she was a very unfavorable case upon which to operate. She did not rally well from the operation, and for several days gave us much anxiety as to the final outcome. However, she began to improve, and to-day is as well, if not better than she ever has been.

In all four of the above cases another item of interest may be noted. Where nothing else would be tolerated in the stomach, buttermilk was never vomited. The profession is indebted to Dr. George F. Beasley, of our city, for this valuable suggestion in feeding patients.

CASE V is Miss M. C., who was referred to me by Dr. Horbaugh, her physician, on April 30, 1898, with a discharging right ear and symptoms of acute mastoiditis. She has a well-marked strumous diathesis. This yielded to the drug method of treatment by June 20th, when she was discharged as cured. Heat was also continuously applied. However, on October 17, 1898, she reported again, with the same ear discharging. Her history revealed an attack of grippe just prior, and which was the cause of the new outbreak of otitis media purulenta. The bone was tender. This was treated by all the ordinary means, and it failed to yield to treatment save that the mastoid tenderness disappeared. The drum was perforated, of course, but no necrosis of the small bones was evident. She began to lose flesh as soon as spring opened and a general decline was manifested, so much so that we determined to get into the middle ear through the mastoid

process, for every evidence pointed to an affection of the mastoid. On July 7, 1899, she was placed upon the operating table at St. Elizabeth Hospital, and, with the assistance of Drs. Horbaugh, Beasley, Davidson, McMahon, Throckmorton and White, the mastoid operation was proceeded with.

Applying the trephine above referred to over the spot beneath which we expected to find the antrum, and giving the bit but a few turns, on its withdrawal we were surprised to find it followed by a gush of blood, which ceased flowing only when the hole in the bone was plugged. We had entered the lateral sinus, which was misplaced. From this point we proceeded more cautiously than at any previous operation, fearing that we might run across the facial nerve in an anomalous position. The cortex was as hard as ivory, which, when removed, revealed a necrosed condition of the bone, with here and there a spot of caries, which was carefully removed, the antrum reached, the *aditus ad antrum* carefully curetted, as well as the middle ear, at the same time using Bishop's facial nerve protector as a guard against accidents. She reacted quite well from the operation, but we were chagrined to find that she had partial paralysis of that side of the face. She could close the eye partially and could not move the muscles of that side of the face and mouth. Here we must disagree with the statement that Dench makes in that otherwise excellent text-book of his upon "Diseases of the Ear." On page 524 he states that "injury to the facial nerve is not a serious accident, function being restored in from three to five weeks, in most cases, under the use of the faradic current." My patient has not yet recovered, and she has been informed that it will be two years before she does recover, if at all, *i. e.*, it will no doubt take that length of time for the facial nerve to regenerate itself. This is the first case of facial paralysis which the writer has had in quite a series of mastoid operations, and is reported because of the misplaced lateral sinus and facial nerve. Such cases are liable to be run across at any time, and notwithstanding all the care that may be taken to cover the facial nerve, either with Stacke's small stovelifter or its modification by Bishop, facial paralysis is likely to follow the operation. Before the operation the patient and friends should be informed of this liability. However, to recur to our case, the present condition of our patient has justified the operation, because she is stout and healthy again, and no more discharge from the middle ear. She is enjoying perfect health, save that the facial paralysis still persists.

In conclusion, it may be said that in operating upon the above cases all the precautions of aseptic surgery were taken. Ether was the anesthetic used.

DISCUSSION.

Dr. William L. Ballenger, of Chicago.—There are some points of interest to me in the paper presented by Dr. Keiper, to which I desire to make brief reference. The doctor speaks of using a trephine for beginning a mastoid operation, and of having opened the lateral sinus in the removal of the button of the bone, and the hemorrhage being so profuse as to necessitate the cessation of the operation. In my opinion it is a bad method to begin a mastoid operation with the trephine. Having a perpendicular wall, the trephine penetrates the tissues without the slant of the external auditory meatus, and there is no way by which the surgeon in operating can estimate whether or not he is entering the lateral sinuses, because his view is entirely obscured by the kind of instrument he uses. For that reason a better method would be the use of the chisel, as is ordinarily done, or the use of the dental engine with a bur, or, as I have often done, the use of the Russian perforator. This perforator is a kind of trephine, but it is cone-shaped, the shavings of bone passing up inside the instrument, and at every turn of your instrument can be removed and field inspected. You know whether or not you are penetrating the lateral sinus, or are in the neighborhood of it. The inside surface of the bone contiguous to the lateral sinus is much larger than the general mass of granular bone. Close to the lateral sinus you will see this firm, white chip of bone, you must steer clear of it, or else you will enter the lateral sinus. It seems to me that the facial nerve is liable to be injured in a series of operations, and whenever we do injure it, in all probability we are somewhat to blame for having done so. I have injured a few facial nerves, and have assumed the blame for having done so, because I believe it can be avoided in many cases. It can be avoided by carefully inspecting the steps of the operation as you go down into the bone, if you use a chisel, or if you use a dental engine with bur, thus affording a better view, and with a strong headlight, you can tell whether you are grazing the facial nerve.

I do not wish to be understood as criticising the doctor's paper, but I have simply given my opinion of what may be done by a slow method of operating. I think the new radical mastoid operation requires about two hours to perform; I have seen some surgeons do the operation in fifteen minutes, but I can not do it in that time. It really takes me nearly two hours to do a thorough mastoid operation.

The point of great interest in Dr. Keiper's paper was the one referring the rise of temperature after operation to infection from the bowel. In operating upon the mastoid, if

we find a rise in temperature, we are liable to blame the condition of the wound for it. As the doctor has said, and suggested, we need not look always to the wound to account for the rise of temperature, as it may be due to autointoxication from the bowel.

Lastly, I desire to say that I have gained valuable suggestions in listening to this excellent paper.

DR. KEIPER (closing the discussion).—With reference to the use of the trephine, as mentioned in the paper, in the last case operated upon, it was not a button of bone which was the cause of the hemorrhage, but it was the bit of the trephine going through the bone before the cutting part of the trephine which had touched the bone was withdrawn.

The Russian perforator, referred to by Dr. Ballenger, I saw this morning. It is an instrument that is not well known in this country. I should consider it a valuable instrument for use in operations on the mastoid, as well as for general bone operations. I would suggest that it be given publicity in some of our medical journals.

We can not place very much reliance upon the rise of temperature as far as mastoiditis is concerned. One patient may have a severe form of the disease without brain complications, and the temperature may go as high as 101° or more, and yet by the temperature we can not diagnosticate the gravity of the case. In the case referred to by Dr. Ballenger, the autointoxication from the bowels may have been responsible for the elevation of temperature. A remarkable feature about the case was that as soon as the bowels were cleaned out and absorption stopped, the temperature declined and did not rise again.

XXIII. BETA-EUCAINE AS AN ANESTHETIC IN EYE, NOSE AND THROAT WORK.

BY WILLIAM H. POOLE, M. D.,
DETROIT, MICH.

Ever since the anesthetic action of cocaine was discovered and its use made practicable by Niemann and Koller there has been a hope in the hearts of many practitioners that some other equally efficient but less toxic drug would be evolved from the chemist's laboratory. As the dangerous condition

frequently following the use of cocaine, even in the hands of the most careful operators, gave birth to the unexpressed as well as oft-reiterated desire for some more safe anesthetic, so, too, it spurred on the chemist in his laboratory researches until success has seemingly crowned his latest efforts, and we have the product beta-eucaine as the result. Exception may be taken to the foregoing on behalf of the ophthalmologist pure and simple, who has come to regard it as an axiom that cocaine meets every requirement that could reasonably be expected of a local anesthetic; but we must not lose sight of the fact that the great majority of ophthalmologists include nose and throat diseases in their practice, and while they may have no fault to find with cocaine as an anesthetic in the ophthalmological part of their operative work, yet this does not hold good in their rhinological and laryngological cases. I presume we each and all have had patients who, after a minimum dose of cocaine was applied to the nose or throat, grew dizzy, faint, had a pallid countenance, with disturbed circulation, spasmodic action of the heart, great dyspnea and final collapse into unconsciousness. I have at different times had such an experience following the local application of the drug, not only in the nose and throat, but in an eye case which will be referred to later on. Hence arises the interest I feel in this newer product which in my experience has proven equally efficacious as an anesthetic without producing the toxic effects above enumerated.

There are two entirely distinct products sold as eucaine, the distinction being made by naming one alpha-eucaine, the other beta-eucaine. Beta-eucaine is the one I am more particularly interested in at this time, though clinically there is no distinction necessary excepting that of irritation to the eye. It was on account of this irritation in the use of eucaine A that eucaine B was brought out and made available, as in the latter the irritant effects are minimal. Eucaine B is a stable chemical compound which is not decomposed by heating even up to the boiling point. This is a decided advantage over cocaine solutions, which do not keep well and are decomposed by heat, whereas the eucaine solution can always be speedily made aseptic by boiling without in any way destroying the activity of the drug.

There are three conditions that must be fulfilled before a drug can lay claim to being an ideal anesthetic, viz.: the reduction of pain to a minimum, increasing the facilities of the operator to the maximum, and producing no unpleasant after effects. As co-factors of these requirements I must consider the method of application, temperament of the patient, and skill of the operator. First, as to the reduction of pain or producing anesthesia, I have found from my experiments, both clinical and in private practice, that we possess in eucaine an anesthetic by the aid of which we can render the mucous membrane so insensible that local operations may be performed without suffering on the part of the patient. The mode of applying the solution governs to a great extent the degree of anesthesia, and consequent comfort to both patient and operator. Instillation is the preferable method in eye and ear cases, while in those of nose and throat better results will be obtained from contact with a saturated pledget of absorbent cotton. Spraying the nasal cavity, be it ever so skillfully done, will not prove as satisfactory as a properly shaped and carefully applied cotton pledget. By properly shaped I mean spindle shaped, which is easily made by lightly twisting the cotton around the end of a probe, saturating it in beta-eucaine solution, and placing it in position so that it lies parallel with the turbinate. The probe is then withdrawn, leaving the cotton *in situ*. In throat work swabbing with cotton, holding the cotton in contact with part, and renewing the application produces satisfactory anesthesia.

The strength of the solution necessary to secure anesthesia depends largely upon what is to be done and the region affected. In ophthalmologic cases a 2 per cent. solution produces anesthesia fully equal to that obtained by 4 per cent. cocaine solution. In addition to its use preparatory to operative procedure, it serves an excellent purpose in overcoming the irritability arising from applications of silver and copper to the conjunctiva, the removal of foreign bodies, and many other conditions. This 2 per cent. solution is admirably serviceable also in all cases in which a thorough examination of the nares, pharynx, or larynx is necessary, where through irritability or hypersensitiveness of the parts such an examination would otherwise prove well-nigh impossible. In those

patients who are intolerant of laryngoscopy, as well as in some in whom irritating applications have to be made to the larynx, this solution is of great service. In operations in the nasal chambers, the nasopharynx, the pharynx, and larynx, a solution of from 4 to 10 per cent. is required to secure satisfactory results.

The second condition necessary to an ideal anesthetic is that it shall aid the operator to the fullest possible extent. In discussing this point I shall necessarily have to consider (*a*) the temperament of the patient, (*b*) the rapidity, intensity and extent of the anesthesia, and (*c*) the systemic as well as the local action of the drug.

(*a*) Regarding the temperament of the patient, we have each of us undoubtedly met with patients of that peculiar mental and physical combination of make-up that they involuntarily were a great help or a great hindrance to the operator.

(*b*) As to the rapidity, intensity, and duration of the anesthesia, I have found that there is a great difference in individuals as to the time required to secure satisfactory anesthesia; but in a majority of cases the effect of the drug has been noticeable in two or three minutes, anesthesia being obtained in from five to ten minutes after the application of the solution was begun, and lasting from eighteen to twenty minutes.

(*c*) In regard to the systemic action of the drug, I have yet to see the first case in which it has produced any heart depression or other objectionable symptoms indicating systemic poisoning.

Locally the action of the drug differs essentially from that of cocaine in nearly every respect, except that of producing anesthesia. In this it is fully as efficient and in some instances more so. While it is obvious that an exact comparison of the action of the two drugs is a matter of some difficulty, owing to the idiosyncrasy and varied sensitiveness to suffering on the part of different patients, yet there are certain local effects produced which are decidedly characteristic of each. In my experiments with eucaine B, I made use of a 2 per cent. distilled water solution in three different classes of eyes—those practically normal, those that were inflamed, and in operative cases. Instillation of an equal strength solution of

the two drugs in each eye was made, with the result that some patients complained of more smarting from the cocaine than from the eucaine, while others claimed the reverse. Many of them experienced no discomfort at all.

As to how the ischemia of cocaine, and the lack of it, or possibly its opposite, the slight hyperemia of eucaine, is produced is not within our province at this time to determine, but it is certain that the instillation of eucaine B solution is not followed by that marked whiteness, as if frozen, and hypotonicity of the eye produced by cocaine, neither is the eyeball projected forward with widely dilated pupil. In contrast with this, the eucainized eye presents a normal appearance. In about half my cases only was there a moderate degree of vascular dilatation without forward protusion of the eyeball and without mydriasis, which renders it valuable in operations upon glaucomatous eyes in which the cocaine mydriasis is inconvenient. One great advantage in favor of eucaine is that the accommodation is not affected and the pupil remains unchanged, promptly reacting to light stimulus and convergence. Perfect insensibility of the cornea and conjunctiva is obtained in from two to three minutes, and no cloudiness of the cornea has been observed nor could I observe in the eucainized eye those wavy, broad lines in the cornea so frequently seen in the cocainized eye.

I have made use of beta-eucaine in treating quite a few eyes that were in an inflamed condition, such as cases of foreign bodies in the cornea, keratitis, corneal ulcerations, episcleritis, and iritis. In these several conditions the anesthesia was fully as satisfactory as under cocaine, except, possibly, in the case of iritis, in which there is more congestion of the anterior vessels. Here the patients experience greater relief from the cocaine, owing to its vaso-constrictor action.

I have made use of the drug in the following instances in operating on the eye, ear, nose and throat, obtaining fully as satisfactory obtunding of the sensibilities as could be desired, or as was obtained under cocaine, and in two cases which I will specially mention the use of cocaine was debarred on account of the alarming symptoms which set in under its use, the patient subsequently being operated on under eucaine without

the slightest untoward symptoms arising. *Eye.*—Chalazion extirpation, 5 cases; entropion, 1; trachoma, 2; opening the lacrimal duct, 3; pterygium, 1. *Ear.*—Furuncle of the auditory canal, 2; paracentesis of drum membrane, 1. *Nose.*—Hypertrophied turbinates, galvano-cautery operation, 7; nasal polypi, 3; nasal spur, 2; foreign body, 1. *Throat.*—Abscission of uvula, 2; excision of tonsils, 3. In the eye cases, a 2 per cent. solution was made use of, while in the other cases a 4 or 8 per cent. was deemed advisable.

The third condition or attribute that our ideal anesthetic should possess is that it should give rise to no unpleasant or untoward after effects. In my use of eucaine this has been the case. Following the anesthesia I have found the disturbances of sensation much less lasting, less defined and less unpleasant than when cocaine was used. In fact, the greatest possible difference exists in regard to the toxic action of cocaine and eucaine, as was noted in the two following cases the reports of which are taken from those above mentioned as illustrative of this point.

H. M., aged 38 years, had been troubled with obstructive breathing in the nose for three or four years, which had been getting worse. He had used a spray of Dobell's solution for some time, but with only partial relief. Externally the contour of the nose was changed, being rounded out toward the cheeks on each side, altering the expression of the whole face. On rhinoscopic examination several polypi were discernible, hanging from the attic of the nares. After cleansing the field I applied a 4 per cent. solution of cocaine to the right nares for the purpose of removing some of the growths with a snare. In two or three minutes the patient gave evidence that he was being affected by the drug by his rapid and loud talk and gesticulations. This was followed by great depression and dyspnea, the pulse becoming weak and slow. I placed him in a recumbent position and with the aid of amyl nitrite soon brought about his recovery. The next day, and several different times afterward, I used a 4 per cent. eucaine solution, removing in all twenty-three polypi, and destroying their bases with the galvano-cautery under eucaine, without the slightest trouble manifesting itself and with perfect anesthesia.

W. K., aged 32 years. Multiple chalazion. Left eye, one on inner half of lower lid, one on outer half of upper lid. Instilled cocaine solution in a few minutes caused such alarm-

ing syncope that I was obliged to place him in a horizontal position and use amyl nitrite and ammonia to bring about his recovery, and, of course, suspended operations for that day. Three days following this, however, I extirpated the chalazions under eucaine, without any discomfort to the patient other than a slightly disagreeable hot taste caused by some of the eucaine which had passed down the lacrimal duct. About a month later I removed another chalazion from his right upper eyelid under eucaine, without unpleasant effects.

I have cited these two cases simply to emphasize the fact that there are cases, whether due to idiosyncrasy or not, in which cocaine is precluded, and if eucaine were of use in none other than these it would still be of decided value.

CONCLUSIONS.

1. Eucaine is decidedly less toxic than cocaine, therefore superior to it.
2. Its aqueous solutions keep well and can be sterilized by boiling without destroying the activity of the drug.
3. It produces anesthesia equally well and sometimes better than cocaine.
4. It is superior to cocaine in that it does not cause heart depression or other unpleasant effects.
5. It does not cause mydriasis or disturbances of accommodation, which is an advantage in some cases.
6. It is less dangerous to the cornea than cocaine, inasmuch as it does not cause desquamation of the superficial epithelium.

DISCUSSION.

Dr. Gustavus M. Blech, of Chicago.—I do not think this excellent paper should pass without some discussion. Cocaine has been known to have a good many disadvantages, some of which are the production of certain nervous phenomena in some patients. I have seen patients faint after injection of only a 6 per cent. solution, for the removal of polypoid growths. Here in Chicago, one surgeon of note has had a sad experience. Having injected a 4 per cent. solution of cocaine in the throat with a view to doing a certain operation, the patient dropped dead. This case is on record. We know that cocaine is extremely valuable nevertheless in minor surgery, but it has disadvantages which will always make me

more or less afraid of possible consequences in rectal surgery. I recall a case of proctitis in which I introduced a suppository containing cocaine and opium, and the patient, instead of getting better, grew worse. Thinking it was the opium that had produced the trouble, or that the patient had an idiosyncrasy against the drug, I ordered suppositories of cocaine, and he could not endure them. He had a quick pulse.

Alpha-eucaine and beta-eucaine, two synthetic products, have certain advantages over cocaine and none of the disadvantages that cocaine has. Anesthesia takes place quickly in small doses. I have not yet seen any bad results from them. In minor surgery they are valuable anesthetics, and a good many years will elapse before we get anything better.

DR. POOLE (closing the discussion).—With reference to the two cases cited by me, I wish to say that they were affected by the cocaine from the fact that when they were operated upon some mental or psychic influences were present, and yet these patients were not affected by eucaine. In the case of the first gentleman, upon whom I operated for nasal polypi, after he came to he said: "Did you use cocaine on me?" I said I did. He replied: "I can not stand it." Afterwards I removed twenty-three polypi under eucaine without any untoward symptoms.

There are some other points in line with cocaine that I did not touch upon, and among them the cocaine habit. Those who have made a study of the drug say that there is no such thing as eucaine habit. If it is used extensively, it will be a fortunate thing for the laity. The physiological action of cocaine is that it produces paralysis, first, of the respiratory centers, and then of the heart; while eucaine, where it has been tried experimentally upon animals, produces toxic influences that are made manifest upon the heart, respiration continuing until death occurs.

XXIV. TREATMENT OF NASAL STENOSIS DUE TO DEFLECTIVE SEPTA, WITH OR WITHOUT THICKENING OF THE CONVEX SIDE.

BY JOHN J. KYLE, M. D.,
INDIANAPOLIS, IND.

At first you may imagine this subject has long since been thrashed to pieces. I believe it is important that every physician should give it some attention.

As a result of deflected septum, there usually follows an inflammation in the post-nares and eustachian tube. A catarrhal affection of the chest is produced, which predisposes the patient to pneumonia, tuberculosis of the lungs, asthma, lachrymal inflammation, etc. The circulation is disturbed, in that the red corpuscles are diminished.

Sleep is disturbed on account of imperfect respiration, digestion deranged—a prominent cause of all nervous troubles in children as well as adults. One man has said: "I firmly believe I have more than once changed the moral character of a boy by leeches to the inside of the nose."

The great proportion of deflected septa in criminals has been observed and commented upon in literature. Unfortunately, no one, so far, has been able to state the exact part nature plays in the cure of disease, nor are we able to say what influence the slightest departure from the normal in any one organ has upon the whole system. A change may take place so gradually that it is passed unobserved, and in consequence never classed as a disease.

If the nerve centers are the most remotely affected, the individual may be classed a criminal, degenerate, or, as inferred from Nordau, a genius. We can not graduate the present or remote influence the continued irritation of any peripheral organ may have upon the cortical centers.

It is unreasonable and unjust to assume in every case that

there exists a weak brain, which only requires the slightest stimulus to bring about an abnormal condition. We assume that the whole system is so complex, minute and perfectly formed that the slightest change in any one part must have its influence upon the whole. It is known that the organs of the body readily adjust themselves to any change, yet all must confess that such a proposition in the concrete is hypothetical.

If for want of perfect physiological rest in the conducting nerve fibers a diseased condition of the nerve centers is produced, it is reasonable to deduce that a deflected septum or any morbid condition within the nose which acts as a constant irritant may produce a mental aberration manifesting itself in a variety of ways.

The Board of Education of New York has under consideration the advisability of a periodical examination of the eyes of school children of the public schools. This examination should extend to the nose, throat and ear. Any defect in any one of these organs must play a very important part in the educational advancement of the child. The time will come when educational boards throughout the country will make such an examination a preliminary step in the education of a child.

On account of the sluggish current of air, and often residual air in the partial or completely occluded side, there is produced a perfect storehouse for the preservation and reproduction of micro-organisms which are absorbed into the glandular system or into the alimentary canal, forming ptomaines, which affect especially the nerve centers.

In my opinion the most frequent cause of deflection is trauma. Ulceration of the septum or inflammation within the septum, as noted in a child suffering with congenital syphilis and hypertrophy of the turbinates. A strumous or uric acid diathesis may predispose to perichondritis and subsequent deflection.

D. Braden Kyle remarks that "many of the so-called congenital deformities of the bones of the nose are due to the fact that at birth, during labor, owing to the position of the head in the birth canal, considerable pressure has been exerted upon the soft bones."

The assertion of Zuckerhandal that the septum is never

deviated before the age of seven is disputed by many authorities. The septum in childhood is easily deformed, and when the injury is of sufficient force from fall or blow, or harsh pressure by nurse, or disease, to alter its perfect vertical position, the tendency is to remain convex, and likewise to become thickened. In many cases the deflection, in course of time, completely occludes the side, and produces a marked and progressive deformity of the nose.

Dr. J. Price Brown observes that in healthy individuals the distance between the septum and turbinates on the right side differs from that on the left, produced by the habit, I presume, of blowing the nose with the thumb and forefinger pressed harshly against the side of the nose. The two prominent functions of the nasal mucous membrane are, first, respiratory, and second, olfactory. Any abnormal condition interfering with such functions demands correction.

When any of the forms of deflection are found to exist, what is the best method for us to pursue to bring about a positive result?

Bosworth still advocates the saw, and says he has no reason to make a change or to lose faith in the instrument. In 1875 Adams advocated the crushing and fracturing the parts and holding them in position by splints. Michael advocated the daily compression of the convex side with the finger. Ingals recommends an incision through the membranes of the convex portion of the prominence; he then detaches the membrane a certain distance, exposes the cartilage, taking out a triangle, the base of the triangle being at the base of the nose. The incision is closed up with stitches and supported with tampons. Bishop recommends a septum knife and the amputation of the offending portion. Blandin recommends a stellate punch, the parts to be held in position by plugs.

The following operation, known as the Asch operation, I believe will be the most popular. Before entering into the technique of this operation I desire to call attention to the great amount of hemorrhage that naturally follows such an operation. To lessen this as much as possible after anesthesia is established, a solution of the suprarenal gland is applied for a few seconds to the mucous surface of the septum. The

following formula for the preservation of the gland extract is the best that I have found:

℞. Sat. sol. acid boracic .....ʒl.
Acid carbolic .....gtt. 2.
Aq. camphorat } .....āā ʒ2.
Aq. cinnamon }
Ext. suprarenal gland .....gr. 40.
M. Filter.

That a great many patients will not submit to the confinement in bed and long use of rubber splints may detract from this method. Dr. Asch reports 139 cases operated upon from October, 1898, to April, 1899, all successful.

The following instruments are required; blunt and sharp separator to break up adhesions, tubular vulcanized rubber nasal splints, size No. 6, flattened cutting forceps, which are made specially, and compression forceps. A description of the scissors may better demonstrate the operation. In the words of the author, "they are powerful instruments, curving outward from the point of junction, and meeting again in front, one blade is bent and narrow for introduction in the stenosed nostril, while the other is sharp, with a triangular blade." The patient is thoroughly chloroformed, head well back, forceps are introduced, the blunt blade passing over at the greatest convexity, the triangular blade at the greatest concavity; they are then forcibly closed, making a button hole incision; they are now withdrawn, and a second incision is made in a vertical direction over the first incision, which was parallel to the floor of the nose. With the finger in the nose the convex portion is forcibly pushed into line, breaking the segments at the base. The compression forceps is now introduced to further straighten the septum. Immediately the previously sterilized rubber splints are forced into the nose and held in position by strips of adhesive plaster, the nose is sprayed by sterilized, iced Dobell's solution and bichloride solution. The patient is instructed to remain in bed four days. After twenty-four hours the tube in the non-stenosed side is removed, that in the stenosed side is removed in forty-eight hours, sterilized and reinserted; nose is thoroughly

cleaned before tube is reinserted. This is done daily for one month.

A number of patients positively refuse to reinsert the tube, and in this case I have them report daily for treatment.

Very frequently I have sawed and amputated the offending projection, the nose being carefully plugged. The patient would return in a short time with the nose virtually in as bad a condition as previous to the operation.

Every case is a law unto itself, and we must operate according to the conditions found. The Asch operation, according to my experience, will bring about a positive result.

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DISCUSSION.

DR. WILLIAM L. BALLENGER, of Chicago.—I have been much interested in Dr. Kyle's paper, because it is a subject that is of greater importance than practitioners have regarded it in the past. It is not so much the method of operation that I wish to discuss as one or two other features. First, Dr. Kyle, in his paper, stated that nasal obstruction was due largely to deflection of the septum, and that the Asch operation is the best. There are other operations that are sometimes better than the Asch, but it is not these to which I desire to direct attention, but to the symptoms due to nasal obstruction which he referred to in the early part of the paper. He spoke of nervous phenomena resulting from this condition, without giving any special explanation why they should occur. About two years ago I made some observations from microscopic specimens that led me to investigate experimentally, then to look up the literature of the subject. In looking for an explanation, the lung of a guinea pig was subjected to breathing dry, dust-laden air, in which there was a little bit of nitrate of silver admixed, and a peculiar condition of the air vesicles of the lung was noticed. In many places the air vesicles contained but a single layer of epithelium, or in two or three places as much as twelve layers in thickness.

This suggested the thought to me that in mouth-breathers the same condition is brought about, perhaps in less degree, but in probably the same way. The air, not being properly filtered, moistened and warmed by the nasal respiration, passes down into the lungs as an irritating gas, and at first probably excites simply a swelling of the epithelial layer of the air vesicle; perhaps, later on, very active throwing off of the epithelial cells, some of them becoming agglutinated and adhering to the lining of the air vesicles. The lining would thus become quite thickened, swelling would take place, and this would interfere with the transfusion of gases which takes place in normal respiration; oxygenation would be interfered with, and carbonic acid would not be thrown off as readily with the exhalations. The particular point I wish to call attention to is the interference with the elimination of carbon dioxide, which results in an excess of carbon dioxide in the blood. Its presence in excess in the blood acts as a violent poison to the leucocytes, as well as to the cellular structures. The functions of the leucocytes are, first; to destroy the foreign germs that enter the system; second, to take up the broken-down products which result from faulty or imperfect metabolism. These broken-down products in the circulation act as irritants to the nerves and cellular elements with which they come in contact. In consequence of cellular irritation, resulting from imperfect functionation of the leucocytes, various physiological disturbances result, chief among them the nervous phenomena which are so peculiar to mouth-breathers, restlessness, tossing about in bed, throwing off the covers, then twisting or changing the position from head to foot during sleep, irritability, aprosexia, or inability to apply themselves closely and consecutively in their studies. All of these phenomena may result from the presence of excessive carbon dioxide in the blood.

Dr. O. J. Stein, of Chicago.—As regards choice of operation, there are, of course, a great many different operations performed upon the deflected septum, but I regard the Asch as the most popular one. I have done the operation in the last two or three years in forty or fifty cases, and I have noticed a peculiarity in results. Several cases have come to my office of late, upon whom I operated all the way from nine to twelve or fifteen months ago, and by a casual examination I have been struck with some of the ill effects of the operation, due probably in part to an imperfect understanding on my part of the operation at that time. I refer to deflection in the cartilaginous septum, which is not a desirable sequela of the operation because it causes very annoying

symptoms, and possibly some deformity by the falling in of the bridge of the nose. How this result takes place I am at a loss to say. The operation itself is simple enough to do. First, when I did the Asch operation, I performed it by means of a modified Asch instrument; but I have had the same results from the Asch instrument. As far as the tampons are concerned, that is, the nasal splints that are recommended, the Asch is preferable to the Mayer. Simpson's splint is a very desirable one; it is easy of introduction, and being absolutely aseptic, you can apply as many different sizes of it as you desire, and you can introduce the splint just as far as you want.

DR. KYLE (closing the discussion).—I have never seen any unpleasant results following the Asch operation. I can understand how, in syphilitic cases or some kidney affection, we might expect permanent perforation.

XXV. SURGERY OF THE TURBINATED BONES.

BY J. A. STUCKY, M. D.,
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That few will deny the tendency of the times is toward too much and too radical surgery, I think most of us will agree. I am quite sure that in this age of heroic surgery too much heroism is made use of in the nasal cavities, especially of the turbinate bones, and for this reason I desire to make an appeal for *conservatism*. I am not one of those who believe in "rimming out and polishing the interior of the nose like we would a gun barrel." We are just beginning to appreciate the importance of this organ and to realize that it is placed where it is for more than respiratory, olfactory and cosmetic reasons.

In an assembly like this, consisting of the surgeon and general practitioner as well as the rhinologist, it may not be amiss to recall something of the anatomical relation of the turbinate bones to the interior of the nasal cavities, that we may the better understand how to deal with them when they become pathological. The paramount functions of the nasal

cavities are of a fourfold nature, (1) respiration, (2) olfaction, (3) resonator of the voice, (4) regulator of aeration of the middle ears.

A greater per cent. of the patients consulting the rhinologists do so because of interference with one or more of these functions, and some form of surgery of the turbinate bones is frequently necessary in order to restore the lost function. I only call attention to enough of the anatomy of these peculiar bones that so strangely subdivide the nasal cavities as to enable us to at once appreciate the subject. Of the three turbinate bones, the inferior is entirely unlike the other two, in that it is a distinct and separate bone, being more highly developed and compact, and articulates with the superior maxillary, ethmoid, palate and lachrymal. (Kyle.) The other two, the middle and superior, are offshoots of the lateral mass of the ethmoid, and are, strictly speaking, *ethmoid turbinals*. Of the meati formed by the turbinates, the middle is the most important, because into this nearly all the accessory sinuses open, and obstruction or closure of this means interference with drainage of these sinuses, resulting in loss or impairment of one or more of the functions of the nose. Not only is the inferior turbinate the larger of the three, but it is the only one that is an independent bone; the middle, next in size and importance, and the superior next, both being smaller and thinner. I think it important that we should recognize in this connection a distinction between turbinate bones and turbinate bodies. This is justified from an anatomical and physiological standpoint, but is not generally recognized by teachers and writers upon the subject.

According to Kyle, "the *turbinate bodies* comprise both the mucous membrane and the bone invested, while the venous plexuses themselves have been termed 'Schwellinhörfer' by Zuckerhandl." Bosworth, on the other hand, makes a clearer distinction when he says, "The turbinate bodies are large plexuses of blood vessels beneath the surface of mucous membrane on the face of the inferior and middle turbinate bones."

It is not within the scope of this paper to discuss operative proceedings of the turbinate bodies, or any of the soft tissues covering the bone, but rather the bone itself.

While it is true that the tissues covering the bone are far more frequently found in a pathological condition and require surgical treatment, it is also true that the bone itself in many instances is at fault. When this is the case the mucous membrane and turbinate bodies may be entirely obliterated by chemical and electric cautery, or scissors, forceps and snare, and the later condition of the patient be worse than the former, because of the remaining cicatricial tissue and unnatural dryness of the parts. It must not be forgotten that the turbinate bodies are organs with a very definite sphere of usefulness, and upon their integrity largely depends the condition of the lower respiratory tract as well as the condition of eustachian tubes and middle ear. Even their partial removal or destruction must not be undertaken without a full consideration of the final results. (Seis.)

It is generally accepted that these bodies, by transudation of serum, supply to the inspired air sufficient moisture for all respiratory purposes. In the normal nasal cavity there should be about one-twelfth to one-sixteenth of an inch between the turbinate bone with its coverings and the nasal septum, and if, in a case of partial or complete stenosis, after contracting the soft tissues by an application of a weak solution of cocaine or suprarenal capsule extract, there is not this amount of space, everything else being equal (no special deviation of the septum), it is best to remove a portion of the turbinate bone rather than attempt to increase the lumen by destroying the integrity of the soft tissues. In operating within the nasal cavities, our aim should be not only to remove the diseased conditions, but to restore normal lumen. If vibrations of the sound waves passing through the oropharynx and nasal chamber are interfered with, a lack of resonance and timbre is at once apparent. Not only this, but the pneumatic function of the middle ear being carried on through the eustachian tube, the density of air is regulated by the supply secured through these chambers. If from any cause the nasal passages become occluded, the sense of hearing is quickly influenced, and to preserve this important function a full and free supply of air through these chambers is essential.

The importance of the subject, I think, justified me in

presuming to dwell on the anatomy and physiology, and now we consider briefly the surgical treatment of these bones. The superior turbinate rarely calls for special surgical interference, and for this reason its surgical treatment will not be considered in this paper.

A description of the various pathological conditions calling for surgical treatment of these bones is not necessary, my object being to call attention to what seems to be the best method of removing a part or whole of the bone. Bearing in mind the anatomical relation of the parts, we can easily understand how any destructive agent, such as chemic or electric cautery, or the crushing forceps may, by the reaction following the application, or traumatism in crushing, so interfere with or exaggerate nutrition of the delicate bone as to result in a hyperostosis or hypertrophic condition. Undoubtedly, in many cases of hypertrophy of the mucous membrane, the hypertrophic condition is due to a deformity of the bone itself, which has had much to do with the development of the hypertrophy, or the bone may be enlarged and unrolled in such a manner as to project downward and inward, thus destroying the normal caliber and function of the cavity. The first and most important desideratum in all intranasal operations is to remove only just as much tissue as is absolutely necessary. Now that we are enabled to so satisfactorily control the bleeding while operating, it is not necessary to rush through with the operation on account of the hemorrhage. We can both see and feel more accurately what we are doing.

The crushing or punch forceps, spokeshave and snare should only be used in exceptional cases. In removing a part or whole of the middle turbinate, correctly shaped scissors are the only instrument needed. For this purpose I have found none equal to those devised by C. R. Holmes, of Cincinnati—one for each turbinate, right and left. For turbinectomy or turbinotomy of the lower bone, the narrow-bladed scalpel, saw, and strong, straight scissors are needed. An incision through the soft tissues is made along the edge of the bone; this is peeled back with back of scalpel and the bone exposed. Should this be too firm to cut with the scissors, a narrow, thin saw is used. In operating with the

instruments named we are less liable to remove more tissue than necessary, and not so liable to have necrosing osteitis or ethmoiditis as would follow crushing with the snare or the piecemeal gnawing with biting forceps or gouge. Besides, we have the greater advantage of a clean-cut surface, with little or no injury to the septum and adjacent tissue, a great desideratum in the process of healing. In addition to this, we have a linear scar instead of a large, flat one, as would be caused by snare and forceps.

In cases where the knife, saw and scissors can not be used to complete the operation on account of the size, depth and conformation of the nasal chambers, the snare is used to complete the removal of the posterior portion. Little or no dressing is needed after the operation, except when the lower turbinate has been entirely removed; then strips of gauze, placed smoothly over wound, are allowed to remain twenty-four or thirty-six hours, then carefully removed after thoroughly softening with 50 per cent. hydrogen dioxide. The subsequent treatment consists of keeping the parts clean until union is complete.

DISCUSSION.

Dr. William M. Ballenger, of Chicago.—I do not like to let this paper go without some remark, although I have little to say in the way of discussion. I agree with the essayist quite fully in his conservatism with regard to operations upon the turbinated bodies, for their functions are indeed very important. As to his method of operating, his points are well taken. I have in a number of cases seen the type of osteitis following the use of the snare that he speaks of, and have seen the wound persist in discharging pus for two months after the operation. This is due more to the method of operating than to anything else. An instrument that has more cutting surface than the snare is desirable. The scissors of Dr. Holmes affords us a means of doing this operation in a better manner than most of us have been doing it in the past.

Dr. O. J. Stein, of Chicago.—I wish to compliment the doctor on the subject of his paper. It is a very opportune one. The average rhinologist, in doing surgery upon the nose, has a tendency, in operating on the turbinates in particular,

to ignore the bone. In operating upon enlarged turbinates he looks to the surface more; he uses a snare or some method to remove the soft tissues and ignores the bone itself, which is of more importance. As the doctor says, the functions of the superstructures are destroyed by paying so much attention to them.

Dr. George W. Crile, of Cleveland, Ohio.—I would like to inquire of the essayist whether he has observed in operations upon the nose, especially those upon the posterior part of the area under discussion, as well as operations farther back, any cases of respiratory arrest, or any cases of syncope due to reflex inhibition. I wish to say that experimentally it has been demonstrated that there is an area of the nose extending back from the posterior pharynx around to the larynx, in all of which respiratory inhibition takes place on mechanical stimulation of the mucous membrane. This is subject to great change in different individuals, and in most cases there is only respiratory arrest. In some cases it causes a reflex inhibition of the heart. If the mucous membrane is painted with a solution of cocaine in advance, this inhibition can not be reproduced. I would ask the essayist whether he has any data to correspond with the experimental observations?

Dr. Stucky (closing the discussion).—As to the subject of reflex respiratory trouble, referred to by the last speaker, I am at present collecting some data on that point for a paper in the future. I have had two cases recently where, in operating upon the posterior extremities of the inferior turbinates, there was alarming respiratory trouble, and in one case in particular the heart's action was greatly impaired. I did not know the cause of it. Both patients were healthy and robust. In one case I had to labor with a patient for an hour or more before getting him out of the office. I had to resort to the administration of strychnia, whisky and friction. It was not the cocaine, because the patient had no idiosyncrasy for it, and I had used four times as much cocaine on the same patient before. This time I used very little of the cocaine solution. I paint the parts once or twice with 10 per cent. each of resorcin and cocaine in an aqueous solution, and after waiting a few minutes I apply 3 or 4 per cent. of the suprarenal capsule solution. That remains for five or ten minutes, and then I operate. I am satisfied it was not the cocaine intoxication that upset my patient. It was something else.

XXVI. OPERATION ON THE CERVICAL GANGLIA OF THE SYMPATHETIC FOR EPILEPSY, GLAUCOMA AND EXOPHTHALMIC GOITER.

BY EMORY LANPHEAR, M. D., PH. D., LL. D.,
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I wish to briefly mention an operation which has of late attracted much attention in St. Louis, viz.: Jannesco's operation (excision of the cervical ganglia of the sympathetic) for glaucoma, exophthalmic goiter and epilepsy. A number of operations have been made by Dr. James Moores Ball, Professor of Ophthalmology in the St. Louis College of Physicians and Surgeons; Dr. T. C. Witherspoon, Professor of Surgery in the Marion Sims College of Medicine, and myself—with varying results. It is of the practical points only (methods and results) I will speak, leaving to neurologists and physiologists the task of explaining the cause of the changes wrought by the surgeon.

Glaucoma. It is in glaucoma that the most remarkable and satisfactory results have been obtained—results which could in no way be attributed to "suggestion," or to the mental effect of the operation *per se.* Numerous patients have been subjected to the operation under the observation of some of the most competent ophthalmologists of the world, with an undoubted verdict in favor of the procedure. Though it has not caused much commotion in the surgical world, for the relief of glaucoma, Jannesco, of Bucharest, has for quite a time advocated removal of the superior cervical ganglion of the sympathetic. In *La Semaine Médicale*, October 20, 1897, he gave his first published account, recording a few operations and claiming most remarkable results. Thus, a man of fifty had had glaucoma for six years, with total loss of vision for four years; very soon after operation tension fell to normal, and vision was restored sufficiently to enable him to count fingers at six feet. Subsequently he operated upon a

comparatively large number of patients, with equally gratifying results in all but two cases.

Notwithstanding the satisfactory termination of these cases, the operation has been subjected to considerable criticism, chiefly by those who have not tried it nor even watched the progress of a case after operation. Panas, of Paris (*Bulletin de l'Académie de Médecine*, May 24, 1898), commenting upon Jannesco's work, claims that the cases are too few and the reports too early after operation to make it advisable to adopt sympathetectomy as a treatment of either acute, subacute, chronic or simple glaucoma. Hansell and Reber, of Philadelphia (Gould's *Year Book of Medicine and Surgery*, 1899), say: "Panas is right in contending against the adoption of *so serious an operation* when the results claimed are based upon insufficient data."

Nevertheless, experiments are being made in St. Louis, and with promise of success. Dr. James Moores Ball, with his assistant, Dr. E. C. Renaud, has operated upon a number of patients, with fairly satisfactory results; as in one case of chronic glaucoma (which I saw with them), a patient who had scarcely light perception in the affected eye was able to count fingers at eight feet within a short time after operation; and the improvement has, apparently, been permanent.

Seriously, while from the standpoint of the average ophthalmic surgeon, who makes operations of such trifling degree as those for strabismus or cataract, or even does an occasional enucleation, removal of the superior cervical ganglion of the sympathetic may seem a "serious" procedure (as Hansell and Reber term it)—from the standpoint of the general surgeon, accustomed as he is to the most formidable undertakings, with perfect aseptic details the operation is but a simple, easy and perfectly safe one. When it comes, however, to the procedure necessary for epilepsy and exophthalmic goiter, excision of all three of the ganglia upon first one side of the neck, and a week later upon the other, it is, indeed, more than a simple operation, and should not be attempted by the oculist with his usual loose methods of antisepsis. Only the most perfect asepsis can save the patient from danger. But when it is performed by one thoroughly familiar with the surgical anatomy of the neck, and with the

same care as that exercised in making an abdominal section, it is practically free from danger.

Technic. Three methods have been proposed for reaching the superior ganglion: (1) Splitting the sternocleidomastoid near its point of origin, thus coming down directly to the desired spot on the carotid, beneath which lies the ganglion; (2) pushing the muscle backward and entering the carotid sheath in front; and (3) pushing the muscle forward, raising the carotid, jugular and pneumogastric, thus reaching the underlying ganglion. The last named is easiest. In either instance the ganglion is seized with forceps, pulled away from the carotid and cut at a point near the second ganglion, drawn down, and its upward extension severed as near the base of the skull as possible, and last of all its efferent fibers clipped. The wound is then closed without drainage. As already said, this operation is neither difficult nor dangerous, and can be done within a few minutes by any one familiar with the anatomy of the neck. It is necessary to operate upon only the affected side usually. The effects are immediate, and in favorable cases permanent and satisfactory.

Exophthalmic Goiter. Hitherto operations for exophthalmic goiter have been limited to thyroidectomy, with other than thoroughly satisfactory results; and ligation of the thyroid arteries, not yet demonstrated to be of permanent value.

M. Allen Starr, of New York, collected details (Gould's *Year Book*, 1899) of 190 operations for this disease, in which removal of the enlarged thyroid was followed by cure in 74 cases, 45 were relieved of the most distressing symptoms, 3 were unrelieved and 33 died, a mortality of more than 17 per cent.; of which it may be said that an operation which is attended with a mortality of 17 per cent., with a prospect of curing less than 40 per cent., is hardly an ideal one, and scarcely to be recommended. Jannesco, commenting upon Starr's report, claims that most of the successful cases (treated by thyroidectomy) were not true exophthalmic goiter, whereas in the typical cases the mortality was really much higher than the figures given, an argument which appeals strongly to any surgeon who has had much experience in removal of the thyroid; thyroidectomy being an operation of

serious magnitude, even with a patient who has not the tremendous cardiac disturbance of Basedow's disease.

If, therefore, an operation can be devised which is equally or more efficacious, and in skilled hands devoid of danger, a great advance will have been made in the surgical treatment of this grave disease. Ligation of the thyroid arteries was suggested by Kocher, of Bern, as a substitute for the grave thyroidectomy, and has been considerably experimented with. At the Paris Surgical Congress, two years ago, Kocher reported 34 cases operated upon, and Rydygier 22. Of Kocher's patients 31 were relieved—or even cured—and 3 died, from the disease and not from operation; of Rydygier's 20 were cured or greatly relieved, and two were wholly unrelieved. This is certainly a far better showing than from the much more dangerous (in this disease) thyroidectomy, and goes far toward establishing the theory as to the cause of the circulatory and other disturbance upon which removal of the gland is advocated, viz.: an excess of thyroid secretion in the circulation. Removal of the thyroid gland causes, of course, cessation of the secretion of the peculiar liquid, and is sometimes followed by myxedematous symptoms which demand the more or less continuous administration of thyroid extract, the exact equilibrium being occasionally hard to establish. If, then, Kocher's operation (ligation of the thyroid arteries) will cause a permanent atrophy of the gland and consequent diminution of its secretion, it follows naturally that it is the ideal operation for exophthalmic goiter, granting this disease to be dependent upon the cause just mentioned; but, unfortunately, this point has not yet been determined, and therefore Kocher's treatment, like other methods, must still be regarded as purely experimental, with clinical evidences thus far greatly in its favor, so far as concerns the cardiac symptoms at least.

But a number of investigators along the line of surgical cure of this peculiar affection have been struck with the necessity of doing something which would relieve the ocular symptoms as well as the cardiac; and excision or resection of the cervical sympathetic seemed to best meet the indications. Quite a number of patients have been operated on with varying results. Faure, of Paris (Gould's *Year Book*,

1889), has excised the cervical ganglia of the sympathetic in three cases, with one death, and advises bilateral removal, with a delay of a few days between operations. Jannesco (*Ibid.*) reported three cases of single section of the cervical sympathetic, all successful; partial excision twelve times, with eleven relieved, and one not successful. Gerard-Marchand and Abadie (*Presse Médicale*, July 3, 1897) also report a case in which operation was not followed by any disagreeable symptoms, though there was marked dilatation of both pupils; at the end of ten days the patient could close both eyes, there being such diminution in the protrusion of the eyeballs. They claim that the explanation of relief from thyroidectomy is not the lessening of the thyroid secretion, but the disarrangement of the cervical sympathetic during the manipulation necessary to effect removal of the gland; their theory being that the symptoms found in exophthalmic goiter are dependent upon excitation of the vasodilators of the cervical sympathetic, so that removal of the ganglion, doing away with this, effects a cure. Whether or not this is the true explanation of the peculiar phenomena of this disease, the operation is worthy of further trial, judging from clinical evidences thus far presented. In Dr. Witherspoon's case, operated upon some two weeks ago, there has been quite a decided improvement.

Technic. After thorough preparation, an incision is made from the tip of the mastoid to the acromion, and the sternocleidomastoid muscle quickly exposed, the external jugular being ligated and cut. The upper part of the sternocleidomastoid may have to be split. The great vessels and pneumogastric are then exposed by blunt dissection, and, when thoroughly bared, are lifted upward and forward and the upper ganglion searched for. When found, it is to be carefully dissected out without rupture of its connecting filaments with the middle ganglion, as these must be the guide to the middle and lower ganglia. At this point the efferent nerves must be cut; they are the filaments which go to the eye.

The upper ganglion having been liberated, the sympathetic tract is followed downward to the little enlargement called the middle ganglion. There is really no cause for

removal of this ganglion as it is in no way connected with the pathology of the disease—it is merely a matter of convenience in reaching the lower, and in this disease, the most important ganglion. Some difficulty is experienced in locating and removing this as it often lies in part behind and below the outer end of the clavicle. It is, when dissected loose, removed with scissors and the wound packed firmly with gauze to control oozing, which is not serious. When all oozing is checked, the great vessels are allowed to fall into place, and the deep fascia sutured with catgut—great care being exercised that no "dead spaces" are left as possible foci of infection. About two other rows of sutures are needed to properly close the wound. The cut in the skin may be closed as best suits the operator; I prefer chromicised catgut. The entire head, chest and neck are then enveloped in sublimate gauze, cotton and starch bandages—the probability of infection being great unless the most extreme care is taken in applying the dressings. With children (in the same operation for epilepsy), in addition to the starched crinoline dressing of the wounded parts, I would advise the application of a small amount of plaster of Paris bandage around each elbow, so the fingers can not possibly be brought to the wound.

The dressings are allowed to remain six to ten days, until operation on the opposite side.

Some European operators have advised operation upon both sides at the same time. I do not believe it is proper, especially in goiter where the heart is so disturbed that prolonged anesthesia must be highly dangerous; and in an operation which, from its peculiar character, so profoundly affects cardiac action.

If performed under ideal asepsis there is absolutely no pain following the procedure; and the discomfort of the stiff dressing and recumbent posture is not sufficient to cause the patient to reject the second operation.

Epilepsy. It is in epilepsy, however, that this operation will have its widest field of application, if further experiments bear out present indications. For long it has been held, by some, that in epilepsy there is a constant excitation of the vasodilators of the cervical sympathetic, resulting in a

chronic irritability of the brain; and upon this theory a number of patients were some years ago subjected to simple section of the cervical sympathetic—with a marked improvement in most instances, but with almost universal return, gradually, from restoration of the nerve fibers, as we may presume; so that, instead of simple section of the nerves, complete removal of the entire chain of ganglia upon each side of the neck is now practiced—with what appears to be a permanent and satisfactory result in some cases.

It must be admitted, however, that too few operations have yet been made in this disease, and too short a time has elapsed since most of them have been performed, to allow more to be said than that results thus far obtained are sufficiently encouraging to warrant further trial; but enough experimentation has been made to justify formulation of certain conclusions, thus:

1. Every case must be an experiment unto itself. No man can say in advance that a certain patient will or will not be benefited by operation.

2. The results are not dependent upon the degree of susceptibility of the patient (as is too often the case with other operations for epilepsy), but upon the marked changes which take place in the cerebral circulation.

3. Cases of more than four years' duration can not be promised any hope of improvement, as results have thus far been negative in all such cases experimented with.

4. Of cases recently developed, a few are cured; others are improved, many unchanged.

But as already declared, enough improvement has been noted to warrant further experimentation. I believe, though, that it should be fully explained to every patient (or his friends) that the work is purely experimental, and that nothing can be definitely promised, save that he will not be made worse—which is true. If, in the face of these explanations, the patient is willing to submit to operation, it is justifiable.

None of the patients operated upon in this country has passed the period when it may be said that a cure has been effected, as at least two years must elapse after the last paroxysm before the patient can be said to be well. The internal treatment which has been found to be most efficacious

in each particular case should be continued during this period of two years' waiting.

Unfortunately, not many patients will submit to operation after full explanations are made, as just suggested. Most epileptics have been "fooled" too often by charlatans and others, who "work" these unfortunates for all they are worth, and thereby render them suspicious of the motive of every true investigator. A few have had the courage to undergo the ordeal of what to them appears a severe operation, and which necessitates remaining in a hospital for a period of two weeks if all goes well. But, while without danger, occasional complications arise of gravest import. Thus, in one of my operations marked symptoms followed a removal of the ganglia of the left side (those of the right having been previously excised) similar to those observed by Rodocanche (London *Lancet*, October 9, 1897) following removal of the thyroid, viz.: restlessness, rapid pulse and accelerated respiration, increased mental activity, etc., giving rise to the suspicion that Marchand and Abadie are right in their supposition that the good results obtained from thyroidectomy in exophthalmic goiter (just alluded to) are due in great part to unintended interference with the cervical sympathetic. In my case—a woman of 30, epileptic six years—during extirpation of the inferior ganglion the vertebral artery was accidentally torn at a point so near its origin as to necessitate ligation of the subclavian. There was unusual shock following the operation, with temperature of 96°, pulse above 110 and respiration 30; twenty-two hours after operation she had a violent epileptic seizure, followed by so complete collapse that for two days we feared she would die; pulse more than 150, respiration above 40, temperature 97° or less, much restlessness, not controlled by morphine and atropine until heroic doses were given. She gradually rallied; the pulse and respiration became normal, and temperature rose to 99½° on the fourth day, followed by uneventful convalescence, the only symptom of note being the unequal dilation of the pupils.

In conclusion, I can but say this is only a preliminary, fragmentary report, which I hope to supplement next year by a full record, including details of all my cases operated upon.

I now have two cases of exophthalmic goiter and seventy-two of epilepsy under advisement, many of which I expect to be able to report upon at our next meeting. But however unsatisfactory this paper may be, I hope it may attract sufficient attention that others may be induced to try the method in these diseases which have thus far too often proven incurable by either medical or surgical measures.

DISCUSSION.

Dr. Harold M. Moyer, of Chicago.—I have listened with great interest to this paper, it being along the line of the late report of Jannesco regarding section of the superior cervical ganglia. The possible benefit to be derived from this measure in exophthalmic goiter is one worthy of further experimentation, and in my judgment, in the cases that are operated upon, operation ought to be done as early as possible. I believe the same will apply to exophthalmic goiter as to epilepsy. If the operation is done late, not nearly the benefit will accrue as though it were done early. This leads me to say that in the vast majority of cases of exophthalmic goiter the symptoms begin insidiously; a few are abrupt, but the vast majority begin, first, with disturbance of the circulation, and perhaps scarcely an appreciable enlargement of the thyroid, and the most unfortunate thing is that the diagnosis is, as a rule, not made early. If the cases can be obtained early, I think there is a possibility of this operation being of benefit.

Dr. Lanphear takes a conservative ground. There is as yet but little data at hand to determine positively whether this operation will be of great benefit or not. I am confident that after the disease is thoroughly established and has existed for several years, and the exophthalmus and tachycardia are marked, with general nervous phenomena, such as interference with nutrition, etc., the operation in such cases will be at most only palliative.

Regarding the application of the operation to epilepsy, I think it is absolutely worthless. It is not a new operation. Some few years since the operation of Alexander was much exploited, the ligation of the vertebral arteries for epilepsy, and the results were anything but favorable. The operation was done a number of times in this city, and the late Dr. Jewell, of Chicago, who died, I think, in 1888, one of our eminent neurologists, said that the effect of that operation was not due to the ligation of the vertebrals, but to the

probable influence of the section on the concomitant cervical ganglia. He said, further, the operation should be a high one in ligating the vertebral arteries, so as to include a section of the cervical sympathetic; consequently the operation, as done in this city, was done under his direction, and they were high operations. I gathered at that time, in 1886, all cases that had been operated upon in this city, and I found that those operations which had involved the cervical sympathetic, upon which section had been made, had not done as well as those in which there was low ligation of the arteries, showing that there was nothing to be gained from this operation, and that was exactly what we might expect.

DR. LANPHEAR (closing the discussion).—I approve of the position taken by Dr. Moyer, so far as exophthalmic goiter is concerned. He has voiced my sentiments exactly. So far as epilepsy is concerned, I can see a vast difference in a simple section of the sympathetic and an excision of the cervical ganglia. There is a vast difference in the long-continued effect, in one instance, where there will be a restoration of the equilibrium within a short time, and of course the operation, as Dr. Moyer expressed it in his report of those cases that came under the observation of Dr. Jewell, could not be permanent. Simple section does not cure. Excision of the entire ganglionic chain on both sides of the neck causes permanent and profound disturbance of the cerebral circulation, which clinically has proven efficacious. That it has proven curative, as I have already said, I can not say positively, because two years have not yet elapsed since the first operation of total excision was done for Graves' disease. But when Dr. Moyer will explain the pathology of epilepsy, I am satisfied he will then believe that he has a right in saying there is no possibility of relief from surgical treatment. Until he is able to do that, I maintain that facts are better than theory, and so long as an operation of such comparatively slight magnitude as the one I have described gives relief for one or more years, it is a desirable operation, although it may not prove curative. That it is not due to autosuggestion has been amply demonstrated by the results thus far obtained.

XXVII. THE IMPORTANCE OF A BACTERIOLOGICAL DIAGNOSIS IN ALL DISEASES OF THE CONJUNCTIVA AND CORNEA.

BY J. O. STILLSON, M. D.,
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The conjunctival culdesacs and the epithelial surface of the cornea do not form a closed cavity in any sense of the word. Both structures are portions of the ectoderm. They are the outgrowth of the membrane which forms the external surface of the body, modified to be sure, but nevertheless in all essential particulars the same; particularly so when we come to consider their physiological aspect as well as their pathological states under unwholesome environments, their exposure to traumatisms, their behavior after exanthematous fevers, after diseases of the respiratory tract, and even after senile and constitutional changes the index and expression of which is looked for and found as a rule in the skin and mucous surfaces earlier than any other place in the body. In view of these facts it is not strange that an early recognition of a possible microbian factor should have been thought of and hailed as a welcome explanation to many of those obscure questions which in the domain of ophthalmology had remained completely unanswered. Conclusions in science, however, are not as a rule guessed at. Theories, however finely spun, however plausible on their surface, must be backed up by a reasonable display of facts before being entitled to live, hence more or less confusion always results when we attempt to unite *a priori* reasoning with inductive knowledge.

The germ theory of diseases was for the ophthalmologist anything but plain sailing at first. To him many inconsistencies and many confusions arose from time to time to prevent him from accepting without reserve the gospel of a new religion which his professional brother, the general surgeon, had

already died on and gone to heaven on, we might say, almost a decade before him. Some excuse possibly may be offered for this lack of knowledge when we pause to consider the wholly different nature of the operative field presented to the two individuals, both equally skillful, and both equally conscientious, let us hope. The one had, so to speak, a field either aseptic of its own nature or one which he could make aseptic by his art, while the other, applying the same rules to his field, found an additional difficulty in the way due to the fact that his field of operation was of itself never wholly aseptic, and could only be rendered so to a certain, or rather to an uncertain, degree. The fault, therefore, in the beginning consisted in the fact that all bacteria were thought to be pathogenic in some way, more or less, either of themselves or by reason of their products, and confusion arose through the inability of the diagnostician to differentiate between those forms which we now know and accept as necessary and essential to health and those which by their presence reproduce disease or interfere with the healing of wounds. Patient, systematic research had to precede accurate knowledge.

Here a field cursed by empiricism had to be reclaimed from the vilest of quackery, to say nothing of the enormous amount of lay superstition to be overcome; so that the ophthalmologist could not begin at the beginning, so to speak, and call all microbes germs of disease and teach his patients how to avoid them as did the surgeon, but he had to go farther than the beginning; he had something to unlearn, viz.: that not all bacteria are disease-producing; consequently his place of beginning in his study of bacteriology, so far as the practical side of the question was concerned, was required to be on lines as yet not discovered. Of course he made failures.

In 1887 Eugene A. Fick, of the University of Zürich, wrote a splendid monograph, entitled: "*Ueber Micro-organismen im Conjunctivalsack.*" (1)

In the preface of this work occurs the following statement: "*Es ist doch gerade für zwei der wichtigsten Augenkrankheiten, für die Blennorrhöe und das Trachom, die Infectiosität längst bekannt; ist es doch aus dem Wesen, aus der Naturgeschichte dieser Krankheiten klar, dass die Ursache der Infectiosität ein Contagium vivum sein muss. Es lag also nahe*

genug einen Micro-organismus für den Träger des Contagiums für das Contagium selbst zu erklären, falls sich ein solcher bei jenen Krankheiten auffinden lies."

But this author goes on to state that it is not enough to discover and prove that a certain micro-organism is present in a certain disease. It is necessary beyond this to show that it is always present in that particular disease, and not in health; further, that its culture will produce the particular disease and no other, whenever it is brought in contact with the healthy tissue which constitutes its habitat.

Fick (*loc. cit.*), recognizing that the gonococcus of Neisser occurs without (2) exception in the conjunctival secretion of blennorrhea (so called, using the term in the sense we now use the term, gonorrheal ophthalmia), also recognized the fact that other forms of diplococci are met with in this particular secretion; that these latter or quite similar forms are to be found in inflammatory diseases of the conjunctiva, not due to gonorrheal infection; that these similar, though not identical, forms of micro-organisms, which were sometimes present with the gonococcus of Neisser, and sometimes absent, might sometimes be mistaken for the latter; but that cultures free from the Neisser germ when placed in the conjunctival sac had no power to produce a true blennorrhea, *i. e.*, gonorrheal, leucorrheal conjunctivitis, whereas any secretion holding the Neisser germ, no matter from what source, and its cultures also, would invariably produce this disease. He quotes from (3) Hirschberg, Krause, Kroner and Pagenstecher, who had accepted the theory of Neisser (4). Following this, his examinations were directed to both sound and diseased eyes. He tabulates two sets of experiments. In the first set there were 85 eyes, *i. e.*, conjunctival sacs, examined. Of the 85 eyes 49 were sound and 36 were pathological. Of the 49 sound eyes bacilli were present in 39, or 88 per cent.; mixed forms of both micrococci and bacilli present in 9, or 21 per cent., and micrococci only in none of the cases; and in 6 cases, or 12 per cent., no organisms were found; in 36, or 100 per cent., mixed micrococci and bacilli (rods) were found in 29, or 61 per cent., whereas micrococci alone were found in none of the cases.

This author's set of cases was selected from persons who were not inmates of any hospital, that is, from sources where

the air was not always alike or the same for all the cases. In this set there were 26 persons, that is, 50 conjunctivas; six of these persons were servants about the college, seven were young physicians or professors, three were patients at the ophthalmological clinic, four were school children, and six were members or servants of the doctor's own family. The result was that among these 50 conjunctivas 18 showed bacteria in their secretions (*i. e.*, 36 per cent.), whereas 32, or 64 per cent., were entirely free from bacteria. Comparing the sound eyes of individuals who were inmates of an institution with the sound eyes of those persons who were not inmates, we find that the percentage of eyes where no bacteria appeared was 12 per cent. in the former and 64 per cent. in the latter. This discrepancy would seem to point to atmospheric causes or some other reason, habit of life, employment, diet, acting common to the one set of cases only. Eliminating the possible sources of error, such as the overlooking of germs present but not found where there might have been but few in the secretions, the failure of methods of culture (for we know that not all culture mediæ are equally appropriate for all germs, some requiring one, others another), the methods of staining, whereby some may have failed to take the coloring; in short, making all due allowances, we find from Fick's work that in the conjunctival culdesac there may be found, with more or less constancy, aërobiotic forms of micro-organisms flourishing, with more or less profusion, according to circumstances. It can not be gainsaid that these vary according to atmospheric purity or pollution; that they exist in conditions of health; that they are also present in disease, and that without any shadow of doubt some forms of them are specific in the true sense of the word, and that by their detection and culture an undeniable advantage is attained in point of diagnosis, which is the basis of all treatment that can be called rational, as distinguished from mere empiricism and guesswork.

Leber (5) in a report to the International Ophthalmic Congress, Heidelberg, 1888, gave a résumé of the committee's work for the year to the effect that: "(a) The eye is exposed at all times to infection from without; not infrequently to infection from within. (b) Microbes from the exterior may

enter the eyes in two ways, either by implanting themselves on a wound, which is less frequent, or they may invade the conjunctiva without a traumatism, which is the more frequent, and by their presence engender local inflammation of various kinds. (c) Those which select a traumatic surface are usually such as may be classed under the term pyogenetic, among which we have staphylococci and streptococci. (d) Investigations into the fungoid diseases of the cornea demonstrate the fact that aspergillus is often present in ulcer and abscess of cornea. A colony of fungi introduced into the cornea produces phenomena in that region closely resembling the formation of pus, the corpuscles diffusing themselves into the tissue of the cornea and into the anterior chamber. This is partially corroborated by the fact that certain chemicals, such as copper and mercury, exercise a restraining influence on such diseases. (e) The reaction of the system against this invasion is partially accomplished by the absorption of the pus globules into the blood vessels of the neighborhood, and the phagocytosis which takes place thereupon accounts for the disappearance of the pus corpuscles. (f) The intensity of the reaction caused by certain other microbes (gonococcus, diphtheritic, etc.) upon the conjunctiva is explained by the fact that certain products, ptomaines, from these organisms have such a destructive reaction on the conjunctiva and cornea, breaking down the epithelium even when intact and sound, that the progress of the morbific process outstrips the restraining (antagonistic) work of the phagocytes so that the whole field is converted into a culture medium. (g) All the inflammations, both of the conjunctiva and of the cornea, demand radical investigation, and a revision in classification based on a complete knowledge of their biological, *i. e.*, bacteriological, history; that diphtheritic conjunctivitis and the conjunctivitis of croup are caused by specific micro-organisms, (6) Klebs-Loeffler bacillus, which have been isolated and cultivated; that (7) catarrhal conjunctivitis is probably caused by the bacillus of Weeks; that there are other bacteria which are capable under certain circumstances of producing the suppurative process, but that ordinarily they do not do so, among which may be mentioned the micrococcus prodigiosus; that there are other kinds of affections bacterial in nature which

arise in the eye, owing to transmission there by way of the circulation both of the blood vessels and lymphatics." (8)

Miles Standish (9) in 1896, writing on diphtheritic conjunctivitis, claimed that there were "many cases of this disease which did not follow the classical clinical picture that we call diphtheritic conjunctivitis, and consequently many more destructive processes were diphtheritic than we had hitherto been led to suppose, and he had felt the importance of an early bacteriological diagnosis, for the reason that if those cases were treated with antitoxin they would run a much milder course and the cornea thereby be saved with the preservation of vision." He found that the pathological process was due to an infection of Klebs-Loeffler bacillus. This author claims that (10) (a) in all cases of purulent conjunctivitis the diagnosis should depend upon the bacteriological investigation and not on the clinical appearances; (b) that diphtheritic conjunctivitis may be present in localized areas without the conjunctiva being affected as a whole; (c) that ulcers of the cornea with exceedingly rapid necrosis may be due to infection with the Klebs-Loeffler bacillus; (d) that antitoxin favorably affects both the conjunctival disease and the corneal necrosis.

Morax (11) and Axenfeld (12), in 1896 and 1897, as well as Gifford (13) have published interesting accounts of a diplobacillus of acute and subacute catarrhal conjunctivitis. This is a sausage-shaped organism within a capsule, each link of which usually measures two-thirds of a "mu" ($\frac{1}{15000}$ inch) in length by one and a half "mu" in breadth. It is to be distinguished from certain other pathogenic forms by the fact that it takes most colors but is decolorized by Gram's method (14); it grows upon blood serum, but not upon agar-agar unless mixed with serum. It will not grow upon potato, gelatin or bouillon. While it occurs as a rule by twos, it may form chains. Alt (15) recognized this germ in 1897, but as the symptoms in his case differed from those given by Morax, Axenfeld and Gifford, he thought he had to do with the bacillus of Friedlander until he distinguished it from the latter by the reaction of Gram's method, by which it becomes decolorized, as before stated.

Claims have been made by Pirozeau (16) that he had found

a specific germ of chalazion, but this has not yet been corroborated by other observers, although his observations were on a line not unlike those of Martin, of Bordeaux (18), who nearly twenty years ago claimed that he had observed in the head of pterygiums living forms which he called "vibriones," and which he claimed were the cause of the growths, although he made no cultures nor inoculations of these germs and gave no very accurate description of them so far as morphology, staining, etc., was concerned.

Knapp (19) has long made use of the microscope and culture tube as a means of diagnosis. More than ten years ago the writer witnessed at Dr. Knapp's a demonstration by him of a case of leptothrix of the conjunctiva which had resisted, prior to that time, all the known methods of treatment, and which yielded readily to the antiseptic treatment when applied with reference to the destruction of the vegetable parasite. Knapp also had reported a case of glanders of the under lid which resembled in many respects a syphilitic chancre, and which was only diagnosed from that disease by means of a bacteriological examination. Kibbe (20) and Sajou (21) both confirm this opinion; the latter in his annual, 1898, reports in full the literature of the subject in his chapter on diseases of the conjunctiva. "The normal conjunctiva always contains bacteria, among which the staphylococcus epidermis albus is found with such frequency that it must be considered a regular inhabitant of the culdesac. This coccus, though but slightly pathogenic ordinarily, may under certain conditions become quite harmful." In catarrhal conjunctivitis actinomycosis colonies occurring as little grains, sometimes yellowish, sometimes resembling little balls covered with epithelium, were found. Scraping sufficed to remove the colonies, which, however, were not subjected to culture (22). The year book of 1898 brings the subject down to the present, except what has appeared in the journals since the beginning of this year, and not yet compiled. He proposed the name subacute conjunctivitis for a "frequently observed variety of conjunctivitis caused by a particular micro-organism." It affects all ages, but especially the adult and old age; the onset is sudden, and its course is marked with slight mucopurulent discharge and sensation of smarting, but without actual pain.

It is apt to be bilateral and does not as a rule complicate the cornea. The micro-organism is a diplobacillus appearing as two short rods separated by a clear space. Sometimes these may form chains. It differs from the bacillus of Friedlander in having, as some claim, no capsule and being more rod-like. Like the bacillus of Weeks, it is not specially pathogenic for animals (rabbits and guinea pigs), but a pure culture carried through the fifth generation provokes the typical inflammation in man (23).

R. L. Randolph (17), of Baltimore, in a series of 100 patients with normal eyes found bacteria in 87. Smear cultures were made on nutrient agar; colonies appeared in 36 to 48 hours; the organisms in form resembled the staphylococcus pyogenes albus. In two other sets of 50 cases each he made cultures after first washing the conjunctiva with sterilized water and $\frac{1}{5000}$ bichloride solution respectively. The staphylococcus was almost invariably found in the cases which had undergone irrigation as well as in those not washed. The properties of this staphylococcus he states are as follows: Its form is not distinguishable from pyogenes albus, it stains by Gram's method, it liquifies gelatin, it grows on ordinary culture media, including potato, and it coagulates milk, but slower than the yellow pyogenic coccus. For these reasons he believes it to be identical with the skin coccus and that it is a constant inhabitant of the hair follicles, epidermis and conjunctiva; a point which is of very great interest and importance, because "it is more than probable that these bacteria are so firmly attached and imbedded in the conjunctiva as to be beyond the reach of aseptic (sterile) or antiseptic (germicidal) solutions; and nothing but the most vigorous scrubbing would produce complete asepsis, and that aseptic technique upon the eye only means sterile cocaine, sterile atropin, sterile hands and instruments; beyond this all attempts at irrigation of the conjunctival culdesacs are futile in the antiseptic sense." Notwithstanding this able author, the practice has steadily gone on in the direction of more perfect and thorough antisepsis, both in reference to medical treatment and surgery of the eye.

While the title of this paper refers to the diagnosis only, it would almost seem like negligence not to refer briefly at

least to treatment. Rational therapeutics follows rational diagnosis as day follows night. It is the faith within a man concerning his convictions that prompts him to depart from the traditional, from old lines and ruts, and adopt that which is new and progressive, hence the great modification in the caustic astringent treatment so popular in former times.

For instance, in purulent ophthalmia, not gonorrheal, the application of a strong solution of nitrate of silver is now condemned, especially in the early stage, because it is sure, almost, to injure the cornea, (24) because it increases the liability of the cornea to necrosis. When this disease is due to the streptococcus pyogenes, use solutions of permanganate of potash (25) or mercury cyanide, or weak sublimate solutions, or very weak formol (26) solutions with copious irrigations of hot water (27) or boric acid water. Silver solutions (28) are not so liable to do injury to the cornea in true gonorrheal conjunctivitis, unless used carelessly; besides they probably act antiseptically on the gonococcus by coagulating the nitrogenous elements by which the latter are surrounded. Antitoxin (29) undoubtedly modifies and shortens the duration of diphtheritic disease and those ulcers where the Klebs-Loeffler bacillus is present, the disease is thereby cut short and the cornea saved from necrosis. In tubercular disease of the conjunctiva (30) where the bacillus of Koch has been found, constitutional treatment in addition to local surgical measures, the former consisting of injections of tuberculin, have been reported on favorably.

In certain ulcers of the cornea starting as traumatisms, where impurities, foreign bodies, etc., formed the initial lesion, the writer has not hesitated to use the water curettement (31) either with sterilized water or with antiseptic solutions. Time and time again, for the last eight years, this has been practiced; a small stream of water thrown from a hose-like aperture, and with sufficient force to dislodge the necrosed epithelium and clean out the ulcer from the bottom, has yielded the happiest results. In catarrhal conjunctivitis, where the Morax-Axenfeld diplobacillus is present, Gifford (32) recommends highly a $\frac{1}{8}$ to $\frac{1}{10}$ per cent. solution of zinc chloride, which he says will kill all the bacteria in three or four days. The pneumococcus conjunctivitis in the new-born

babe, due to the presence of this germ, which probably finds a suitable culture (33) field in the conjunctiva made hyperemic and irritable by the acrid lochia, without the gonococcus, will yield to conservative antiseptic treatment, boric acid, deod. tincture of opium, hydrastis, etc., and these are the kind of cases which seem to furnish excuse for a multitude of sins, but (34) condemnation can hardly be severe enough upon the obstetrician who has not learned how to prepare the leucorrheic vagina antiseptically for the act of parturition on the one hand, and who knows nothing about the Credé (35) method or protargol on the other hand, and who fails to learn that he should know how to find the gonococcus of Neisser himself, or he should call in council some one who is capable of treating ophthalmia neonatorum. The time has come when the oculist can no longer shield and protect by subterfuges and charity his professional brother in the eyes of the law from the consequences of criminal carelessness and ignorance in those cases where the cornea is perforated and the eyes of an infant are lost before he has called council.

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DISCUSSION.

DR. DUDLEY S. REYNOLDS, of Louisville, Ky.—As I have a paper to read on the same subject as that dealt with by Dr. Stillson, I feel somewhat disarmed. The point I wish to speak about particularly is the method of treatment of corneal ulcers, ulcers which persistently remain, and which show the tendency to extend, just as an infectious condition in any other part of the body. I am not familiar with the doctor's method of the use of a stream of water sufficiently strong to clean out the ulcer, but an infected ulcer tending to extend rather than to diminish requires to be curetted thoroughly, and this followed by antiseptic applications.

There are various opinions as to the value and efficiency of the different antiseptics now in use, but in my own humble judgment carbolic acid is the best disinfectant to use after curetting. I have seen many antiseptics used, but have always favored carbolic acid. I apply it with the point of a very fine needle, passed down against the seat of the ulcer and then swab around it, being careful to avoid pressure on the base of the ulcer so as not to puncture the posterior layer of the cornea. This is generally a very serious affair, although not always disastrous. This method has in my hands often given satisfaction.

DR. J. O. STILLSON, Indianapolis, Ind. (closing the discussion).—My idea is to combine the curettement and the antiseptic by means of a solution, which is thrown against the cornea with sufficient force to dislodge the debris. I have applied the term "water curettement" to this method. I have not been so fortunate with carbolic acid as has Dr. Reynolds.

Doubtless I used too much of it or it was too strong. I always used a very small probe, shaking off the excess of solution, but in my hands carbolic acid has a tendency to work its way between the layers of the cornea, and I have seen cases where the separation of these layers became quite prominent. For this reason I claim that water curettage is better and less dangerous than the simple application of a disinfectant, whether it be carbolic acid or iodoform.

XXVIII. THERAPEUTICS OF INFECTIOUS CONJUNCTIVITIS.

BY DUDLEY S. REYNOLDS, M. D.,
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Infectious conjunctivitis must be understood to include all forms of conjunctivitis that are contagious or communicable from one person to another through various media. It must also include those cases of staphylococcus infection arising from dust. Clinically considered, the mildest form of mucopurulent conjunctivitis, whether in the new-born, in the child, or in the adult, arises necessarily from a common cause. It is the form of conjunctivitis which was long known as the catarrhal. To Dr. Weeks of New York, Dr. Gifford of Omaha, and Dr. Hinde of Chicago, belong much credit for their experimental labors in determining the specific ferment which produces this type of conjunctivitis. Its course is not only milder and slower than the purely purulent types, its sequelæ less grave, but it is vastly more prevalent than any of the purulent forms of infection.

It is somewhat difficult to differentiate active mucopurulent conjunctivitis from a mild type of the purulent infection. Gifford, Morax and Axenfeld have found the pneumococcus during endemic outbreaks in the exudate. Dr. Burnett, of Washington, has been able to confirm these observations. It is clear, therefore, that the bacillus of Weeks, the pneumococcus of Friedlander, the diplococcus of Fränkel, and the micrococcus Pasteuri of Sternberg, each cause a slightly different form of mucopurulent conjunctivitis. There may be

others still undiscovered. In all of them, however, in addition to the light-colored pus in the inner canthus, there are shreds of coagulated mucus in the retrotarsal folds of the conjunctiva. The lids are not much swollen. The exudation, drying on the lashes, causes them to adhere by agglutination. Corneal abrasions are rarely seen in any one of the varieties of this type of infectious conjunctivitis. The infecting ferment rarely takes entire possession of the contents of the mucous follicles of the conjunctiva. Consequently swelling of the lid is not great, invasion of the nutrient canals of the cornea does not take place, and chemosis does not occur. The therapeutic indications are for frequent and thorough removal of the infecting matter by ablutions or irrigation with such mild unirritating saline antiseptic fluids as will aid in the solution of the coagulated material, so sterilizing the surface of the membrane as to retard the growth of the micro-organisms, and at the same time possessing soothing and unirritating properties.

Since the terminal nerves in the surface of the conjunctiva are irritated by ablutions which do not contain chlorid of sodium, it is manifestly clear this salt should constitute one of the ingredients of any solution to be employed for irrigation. Borate of sodium, in solution, containing a small portion of the chlorid, with enough carbolic acid to counteract by its anesthetic effect the mechanical irritation of the frequent and prolonged flowing of the stream from the irrigator over the surface of the membrane, constitutes an all-sufficient and rational plan of treatment. The long-established and irrational practice of attempting to cut short infectious conjunctivitis by the application of caustics may be held responsible for nearly all of the disastrous sequelæ heretofore ascribed to all the varying forms of infectious conjunctivitis. In cases of mucopurulent conjunctivitis caustic applications lead to entropion, symblepharon, cicatricial opacities of the cornea, more or less deep-seated, and xerosis of both cornea and conjunctiva; in fact, all those deformities, cicatrizations, atrophies, sphacelations, and staphylomas formerly attributed to catarrhal and purulent ophthalmia are but the natural results of the caustic treatment employed.

Mr. Benjamin Travers, surgeon to St. Thomas' Hospital,

in 1824, said: "One of the great errors, it appears to me, in the treatment of inflammations of the eye has been the irritation of the organ by stimulant drops and ointments. I am satisfied many eyes have been thus destroyed." Writing of gonorrhea, in 1675, the great Sydenham said: "He who cleanses well cures well." Mr. John Walker, of Manchester, says in his "System of Ophthalmic Surgery," 1857, page 23, in speaking of the treatment of catarrhal ophthalmia: "I am in the habit of preferring the application of the nitrate of silver, or sulphate of copper in substance." In mild cases of the disease, he says, a single application of nitrate of silver will generally be sufficient, if followed by the frequent instillation of a solution of sulphate of zinc, or sulphate of copper.

Of the purulent conjunctivitis, three forms have been described, the mildest one being produced by the staphylococcus pyogenes albus. The next in point of severity is produced by the staphylococcus pyogenes aureus, and the most dreaded and malignant type by the gonococcus of Neisser. In the beginning period of the initial hyperemia the clinical characters are the same. The period of incubation, however, is different in each. Without treatment each of these forms of disease leads to results somewhat different. In each of them the tendency to produce papillary hypertrophy, formerly called granular lids, may be accounted about equal.

The white staphylococcus does not cause much tumefaction of the lids; it does not cause chemosis; it does not tend to produce corneal abrasions or necrosis until the stage of papillary hypertrophy of the palpebral portion of the membrane comes on. In the golden staphylococcus inflammation the lids are tumid from edema. The ferment invades the mucous follicles at the outset and swelling of the papillæ in the palpebral conjunctiva tends to cause corneal abrasions by the time the disease is a week old. In the white staphylococcus inflammation, on the other hand, the engorged papillæ are not notably present within a month from the beginning of the attack. In the gonorrheal infection the lids are enormously swollen and livid; abrasions of the conjunctiva lead to mingling of bloody serum with the earliest formation of pus. Chemosis of the conjunctiva is rarely

absent. Without treatment the cornea undergoes sphacelation and sloughs within the first week. It is manifestly clear that the infecting ferment in the gonorrheal type not only takes possession of the mucous corpuscles and invades the follicles, but likewise the surface epithelium of the interfollicular spaces.

It is well to remember that all the infectious or catarrhal types of conjunctivitis are retarded by the use of alkaline lotions, and that all are intensified and greatly aggravated by the use of stimulating astringents and caustic applications. The treatment by irrigation is the only rational mode of cleansing; it is easy of application, the means of applying it are universally accessible, and the results are all that could be desired.

In the white staphylococcus forms of infection the irrigation may be practised with normal salt solution, or with the following:

℞. Borate of sodium .... ℥ iii.
Chlorid of sodium..... ℥ ss.
Cryst. carbolic acid ..... gr. xv.
Water .... gal. i.

The frequency of the irrigation should be regulated by the accumulation of matter on the surface of the conjunctiva. The upper lid being everted and the irrigating bag hung twelve inches above the plane of the patient's eye, the nozzle of the irrigator may be held over the bridge of the patient's nose and the fluid allowed to run over the everted lid and the inferior retrotarsal surface into a mass of absorbent cotton held on the temple. This should be repeated every half hour, and when the matter accumulates sufficiently to exude between the lids this interval should be shortened by one half. If no accumulation of matter appears the interval may be increased, say, first to one hour, then two hours, and so on, until there is no necessity for repetition of the irrigation.

In the yellow staphylococcus infection the treatment may be precisely the same; it will be found, however, that in some cases the irrigation must be repeated at intervals of ten minutes during a period of two or three days and nights. A

week of assiduous devotion to this method of treatment could scarcely be compassed before complete recovery, unless papillary hypertrophy had already set in.

In the gonorrheal type the same plan may be pursued, but a more efficient irrigation may be made by dissolving three ounces of chloride of sodium, eight grains of bichlorid of mercury, and one-half dram of carbolic acid in one gallon of water, which should be filtered before using. With this the eye may be irrigated every ten minutes from the very beginning of the attack, and if the treatment is commenced before corneal or conjunctival abrasions occur it is well-nigh certain they will not occur afterward. There is always some danger, in the case of infants especially, of the cornea being injured by the nurse's finger-nails, and, lest this accident should occur from contact with the nozzle of the irrigator, great care should be taken never to allow the instrument to approach nearer than one inch. To perform the irrigation properly two persons are required. Having prepared the irrigation and placed the patient on his back, one person may evert the lid and hold a mass of absorbent cotton wool on the temple to catch the outcoming discharge, while the other manipulates the irrigator.

When it is known that more than 25 per cent. of all the blindness in the world has resulted from purulent conjunctivitis, the importance of the most painstaking care in its treatment becomes apparent, and although it may seem a little formidable to have two nurses in constant attendance upon such a patient both day and night for a week or ten days, the fearful consequences of neglect and the almost certain success which may be expected from the exercise of proper precautionary measures repay for trouble and expense. The great therapeutic indication in all cases of purulent conjunctivitis is set forth in Sydenham's declaration that "he who cleanses well cures well." Frequent washing away of accumulated matter must terminate the course of the disease as soon as the whole contents of the invaded mucous follicles shall have been discharged. Since the more general adoption of this treatment of this class of diseases by irrigation, entropion, pannus, anterior staphyloma and symblepharon are practically unknown; even opacities of the cornea are becoming compara-

tively rare from this cause. Blepharitis papillaris also is becoming comparatively rare.

Of the therapeutic agents now in most popular favor, in addition to those already mentioned, are nitrate of potassium in combination with hydrastis, formalin, 1 to 2,000, or 1 to 4,000; nitrate of silver, 1 to 2,000 or 1 to 4,000; corrosive sublimate, 1 to 1,000 or 1 to 10,000; and a saturated solution of boric acid. The advocates of each of these methods of treatment by irrigation report vastly more satisfactory results than were obtainable by the old method of daily cauterization and the use of astringent collyria.

DISCUSSION.

Dr. L. W. Beardsley, of St. Louis, Mo.—In regard to the treatment of these acute forms of conjunctivitis, I would like to say that, in my opinion, the best treatment for a disease is the prevention of it. In that we see the great reduction of the percentages of blindness caused by infectious conjunctivitis. I do not know how it is in Louisville, but in our city we see these cases on about the seventh or eighth day. The practice of midwives is very extensive, and they usually tell their patients that there is nothing to be done for the inflammation of the eye, so that by the time the physician sees it, the condition is far advanced. Personally I have always had a decided preference for silver nitrate, and I invariably use it for two or three days at least.

Dr. J. J. Kyle, Indianapolis, Ind.—It was my good fortune last winter to be in Cuba, where the troops suffered a good deal from acute catarrhal infections. I made examinations for the pneumococcus of Fränkel and found it present in a good many cases. I think that in all acute inflammation of the conjunctiva, a certain amount of attention should be paid to the nasal mucous membrane, as you may have an infection there as well as in the eyes, and treatment should be extended in this direction.

Dr. Reynolds (closing the discussion).—I simply want to say a few words. As soon as Mr. Ridgeway introduced the nitrate of silver applications, and Doctor O'Halloran had used his stick of sulphate of copper, we became more familiar with the fatal sequelæ, entropion, symblepharon and other disturbances of the eyelids. With the initiation of these prac-

tices we observed a more frequent occurrence of this character of deformities, and many more cases of blindness. We knew them not before, and they had never appeared in the literature of medicine and surgery, before the caustic treatment of conjunctivitis.

XXIX. INTROVERSION OF THE IRIS.

BY L. W. BEARDSLEY, M. D.,
ST. LOUIS, MO.

This interesting condition, described by various authors as sinking-in, collapse and retroflection of the iris, was first described by Schmidt,[1] in 1804. Since then Von Ammon,[2] Förster,[3] Passauer,[4] De Wecker,[5] Samelson,[6] Taylor,[7] Parisotti,[8] Praun,[9] and Eales and White,[10] have described cases of either the partial or complete variety, with or without dislocation of the lens.

The commonest etiological factor is a contusion, especially those caused by a bullet which does not pierce, but glances off from the eye. The condition is also seen after operative procedures.

Those who have been so fortunate as to secure the affected eye for examination have found that the iris is turned inward, either in part or entirely, the introverted portion lying backward upon the ciliary body, and is invisible. The cases in which there is but partial introversion are rather more frequent than those of the total variety, which is very rare. There is ofttimes an accompanying dislocation of the lens, and nearly always hemorrhage into the aqueous and vitreous chambers. This hemorrhage, if profuse, interferes with the proper examination for some time, and we are unable to judge with positiveness what confronts us.

As to the mechanics, there is a variance of opinion, with no clear ideas advanced, and no definite results attained as to finding out how it occurs. Von Ammon says, in referring to his case, "How did it occur?" Surely, only by means of the combined concussion of the vitreous body, together with the

dislocation of the lens upward, thereby depriving the iris of the fixed support which the lens provides, permitting it to sink inward. At this moment the return of the vitreous body, followed by the lens, acts upon the iris, preventing its return to the normal position. Förster, however, holds that the pressure of the aqueous upon the periphery of the iris where it is least supported everts it. As Praun contends, this would necessarily imply a paretic condition of the iris, or there would be a tearing of the sphincter. As this is but infrequently the case, Förster's theory will not apply in all cases. Indeed, after careful weighing, I find there is no satisfactory solution to the problem. That introversion occurs has been proven by the anatomic researches of various observers, but how it is caused is still an enigma. At least the concussion theory alone will not suffice, for it is sometimes seen after opening the anterior chamber in various operative procedures.

In a case which came under my observation not long since there were several points of sufficient interest, I believe, to warrant my bringing it before your notice. The history follows:

On July 7, 1898, Jno. C., laborer, age 34, was sent to me by Dr. Shanklin, of our city, with the history of having been kicked in the right eye by his three and a half year old son, on the fourth day preceding. Upon examination I found the following state of affairs present: There was a recent scar in the corner about 3 mm. long, located about 2 mm. from the limbus in the upper portion. There were a number of floating opacities in the anterior chamber, of a dark color, like those seen after hemorrhage. The evidences of iridocyclitic irritation were quite marked. With the ophthalmoscope I could determine the presence of innumerable opacities *in vitreo*. These proved afterward to be partly hemorrhagic, partly broken up lens matter. There was absolutely no iris tissue visible, nor could any of the ciliary processes be seen, neither with the naked eye nor ophthalmoscopically. The patient was an illiterate, and with the dots could see $\frac{6}{xv}$ with the normal eye. Vision in the affected eye was reduced to hand movements at one metre. I used atropine ointment and applied a compress bandage, which was discontinued on the third day, and a solution of atropine given for home use, in conjunction with hot fomentations. There was a gradual recession of the inflammatory process, and when the opacities had sufficiently resorbed, could

determine the aphakia. After quiescence resulted, patient could see $\frac{6}{xxiv}$ (dots) with a plus 12.0 spherical lens. A recent examination shows that patient can see $\frac{6}{xv}$ with plus 12.0 sph., and reads Snellen No. $\frac{}{1}$ with plus 15.0 sph.

The features of especial interest in the case were the total introversion of the iris, the resorption of the lens in a patient of his age, and the good vision remaining after so severe an injury.

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XXX. SOME PHASES OF MALARIA—QUININE IN.

BY WILLIAM BRITT BURNS, M. D.,
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At the first I hope to elicit a wholesome discussion upon the question: Are the hematozoa malariæ, and the telluric and atmospheric conditions which go to make up what we are pleased to call a malarial climate, antagonistic to the bacillus typhosus?

I would like to affirm the question by the statement that out of something over six thousand cases of malarial fever there has not *been one* that has not responded promptly to quinine. Among some of these the clinical picture was strongly suggestive of typhoid fever, and a timorous practician might have withheld quinine on that hypothesis and have hugged himself with the delusion of a diagnosis

of typhoid fever; in all, however, the quinine test cleared up the diagnosis before it was thought necessary to apply the Widal test. With the exception of about a half dozen malignant cases, there has not been one case that did not respond to quinine, at the most in three or four days, the half dozen referred to being clear of fever in from four days to a week, one case prolonged convalescence; but suppose, forsooth, quinine had been exhibited for only twenty-four or forty-eight hours, and there remained pyrexia? This with a clinical picture of typhoid fever. Maybe the blood had been examined; a crescent or an ovoid was present; there was a diminution of the polymorphonuclear leucocytes; an increase in the mononuclear variety was observed. Would you throw up your hands? That is what they tell you to do. I refer to those who stand for one of the greatest dogmas of the age—*typho-malarial fever*, *continued malarial fever*, *slow fever*. They tell you that if you do not control the fever in two or three days at the outside, it is a case of slow fever (?) and will have to run its course—discontinue the quinine.

I am aware that it is maintained that it is possible for the hematozoa malariæ and bacillus typhosus to inhabit the human economy at one and the same time, but it is stated as occurring in very rare instances, and in these instances the malarial infection is only found and only makes itself felt in the decline of the attack. Then, too, these cases were shown to have had chills some time prior to the typhoidal attack, evidencing a latent malarial element, which was imported into a climate where typhoid fever abounds, and where the tertian organism is rare and the estivo-autumnal organisms are practically unknown. It is a fact that where a person infected with malaria is taken to a non-malarial climate, the malarial parasite becomes less and less active until finally all manifestation of that infection disappears. The reason for this is not far to seek. First, you have that buoyancy that comes with change of action, change of scene from a dismal swamp, dense undergrowth and stagnant pools, to wooded hills, clear grounds and running brooks; from tired looks, tired feelings, slow, faltering gait, dull eyes and skin of bronze and old brass to well-fed, clean-cut expression, buoyant spirits, quick agile steps, eyes full of the lustre of life

and cheeks aglow with the bloom of health. What with the pleasant environments and wholesome associates, he has a mind to feel better and stronger, and he does; the hematozoa finds itself in a strange land, with no hopes of reinforcement from either air or water or telluric conditions. Controversely, the enemy's camp is fast recruiting oxygen, better cell action of blood and gland is rapidly promoting; phagocytosis clears the field, and retreat and defeat is its lot.

Osler says: "It is interesting to note that among the 685 cases of typhoid fever, in not a single instance were the plasmodia found in the blood during the course of the disease. Many of our typhoid fever cases come from malarial regions."

I have deemed it of sufficient interest to note that among 6,000 cases of undoubted malarial fever, not a single case of typhoid infection occurred, all responding so readily to quinine that the Widal test was uncalled for.

Typhoid disease is by no means essentially an urban product; it is prevalent in suburban and rural districts, and is said to be on the increase in these latter localities. In our immediate Mississippi valley the conditions of soil, sewerage and water supply are, to all intents and purposes, what would appear conducive to the propagation of the bacillus typhosus. Why then does it not attack our people?

It is said of the two infections, typhoid and malaria, that the former is much the stronger. This, with the advantage of an insalubrious climate, with a people generally below par, it appears remarkable that typhoid fever does not prevail.

A word with reference to the prevailing notion of some, that there is a continued form of malarial fever, not amenable to quinine. It would seem that these ideas would give way to the truth so brightly portrayed by those aids of pathologic research, the microscope and physio-chemic test. I am very free to admit that a half-hearted use of quinine would allow a given case to go on indefinitely. I do not find, however, as is held by some, that malarial infection is self-limited—tending to recovery. I want to say, with what emphasis I am able to command, that a fever that does not

respond to the proper administration of quinine is not malarial; if, upon the application of the necessary data for diagnosis, typhoid fever is eliminated, we have then to look to some form of autointoxication.

We are coming more and more every day to better understand and more fully appreciate those autotoxemias promoted by synthesis, building up in the economy leucomains and ptomains—leucomains resulting from altered structure or metabolic inactivity of the ductless glands; ptomains from fermentation and putrefactive change in the alimentary tract. There is no infection, it may safely be said, in which the ductless glands are more constantly and grievously affected than in malaria; nor, in the absence of a requisite bile flow, on account of so frequent retardation of liver action in malarial infection, is there a riper medium for fermentation and putrefaction.

Hemorrhagic malaria (*hemoglobinuria*). A case of interest is one in which a young man, who, after five or six estivo-autumnal paroxysms, and between which he insisted upon getting up and going about, developed a marked *purpura hemorrhagica*, bleeding copiously from bowels, mouth, nose and eyes; urine highly colored, full of bile; purple ecchymoses covered him. He gave history of three such attacks, the first coming on a few days after a fall from a horizontal bar. Responded rapidly to large doses of quinine and the tincture of chloride of iron. I have had this year a comparatively large number of cases where there was spitting of blood, with other signs of pneumonia, with, however, no pneumococcic infection, and, while blood-smears from the finger have invariably shown the plasmodia, this has not been true of the red cells found in abundance in the sputa. They have all responded in three or four days to a good gland arousement and quinine.

Hemoglobinuria. There is still a great divergence of views as to the employment of quinine in the treatment of hemoglobinuria. It seems to be pretty well agreed that quinine does produce necrobiosis of blood cells, and that it is irritant to the kidneys—*evidenced* by the appearance of albumin, or, if already present, an increase of albumin on the exhibition of quinine. These conditions prevail, however, as

a rule, in malarial cachexia, and, while in the main they are true, they are transient and salutary; the toxic coefficient of the urine is increased on ingestion of quinine, as is also its volume; that of the blood, on the other hand, is diminished. It is my experience to see all of those kidney lesions where there may be found scanty, scalding, high-colored urine with high specific gravity, loaded with solids, occurring in a malarial climate, clean up with proper use of quinine.

Dock says: "It is a suggestive fact that, while in Africa the malarial black-water fever is a hemoglobinuria, in the United States the condition is almost invariably hematuric."

This does not hold true in my cases; the whole blood rarely ever comes over, only granular matter, remnants of corpuscles and hematin crystals, albumin and casts are found, always showing a typical turpentine guaiacol test.

The pathology of the condition in which the symptom *hemoglobinuria* occurs is yet decidedly obscure, but in our gropings in the dark we have managed to say that from repeated malarial paroxysms we have an increase of plasmodia and of their toxins, and consequently a correspondingly greater destruction of red cells. From the same causes we have inactivity of the glandular system—secretion and excretion—diminished elimination. This in turn fills up the liver and spleen, which, with the accompanying toxemia, cripples the liver and spleen in their offices of doing constructive and destructive metabolism.

Recent investigations seem to show that the metabolic function of the liver is of greater importance than that of the secretion of bile; and that the pancreatic juice, in conjunction with the gastric and intestinal secretions, is entirely capable of taking care of digestion in the absence of bile, but failure in proper liver metabolism results rapidly in intoxication. The pancreatic and intestinal juices are more or less curtailed by reason of the chill and fever, this repeated interference with cell action of blood and glands results in self-empoisonment from impaired metabolism—leucomain poisoning, and from fermentation and putrefaction in the intestinal tract—ptomain poisoning.

These conditions carried to an exaggerated degree—with occlusion of the liver, in which there are necrobiotic areas,

oftentimes a hepatitis, we have cholemia—jaundice increasing —bile salts and bile acids, damming back upon the blood, begin their work of destruction upon the red cells, in conjunction with that of the toxins and débris already circulating in the blood pabulum from parasitic invasion, etc., setting free hemoglobin in the blood. The effect of the poisoned blood, with its great excess of solids, is to set up a nephritis; hemoglobin comes over and hemoglobinuria results.

The mosquito as an intermediary in the life cycle of the parasite. My personal work in this line has not vouchsafed anything especially reassuring of the claims of Ross, Manson and others. Their work is extremely fascinating, alluring indeed, but out of a large number of undoubted *anopheles* examined, captured at all hours of the day, and from the rooms where patients lay whose blood showed the plasmodia, I have failed to discover to my satisfaction anything resembling the human hematozoa in any stage of development. I have found pigment in abundance, but there is nothing distinctive about it. The rapid dancing movement characteristic of malarial pigment is absent. I have been mashing the mosquito out flat between cover glass and slide; have also stained blood smears from mosquitoes, examining under a $\frac{1}{12}$ oil immersion; have examined the larvæ and offal. This may be a portrayal of ignorance on my part; it may be that with a further investigation with a better technique, better understanding, in fact, as to what I am to look for, I may be able to substantiate to my satisfaction the action of the mosquito as a definitive host in malaria.

Quinine in malaria. Early in my career I began to disregard the old idea that "we are not to give quinine while the fever is on." On account of the irritable stomach which obtains at the fastigium, if a patient is seen at that time, I do not insist upon the exhibition of quinine until the beginning of the decline; if the situation is urgent the hypodermatic use of quinine may be necessary. This should be administered at once. In this case quinine is given with the idea of destroying the young hyalines of the present paroxysm. Quinine is given in order to have it in the blood in time to destroy the young hyalines *a-borning;* this would not prevent the paroxysm anticipated, but a second one would be pre-

vented. To do this I should like to have from ten to twenty grains of quinine circulating in the blood at the period of segmentation, starting three to six hours before the expected chill if *per orem* or otherwise than hypodermatically; if the latter, its use is urgent, and at once is the accepted time. I may say that it has been my practice in the great majority of cases to adminster quinine, commencing at the beginning of the decline, keeping it up 3 to 5 grs. every three hours for 24 to 46 hours—longer if necessary. I want to emphasize the importance of commencing at the beginning of the decline, because I believe it is the time when the plasmodia are less capable of resistance, when phagocytosis is at its best and when the stomach is less liable—as at the fastigium—to reject quinine. Not that I believe that quinine is contra-indicated at any stage of the paroxysm. I know that there are cases which are allowed to languish with *slow fever* (?) for days and days, and sometimes weeks, waiting for the fever to get down so that quinine may be administered.

This summer, during a short vacation, a friend of mine told me that he had been going through a siege of three or four weeks every summer, and that by good fortune his medical attendant had to be out of the city for a brief period. In about the second week, and during his absence, my friend purchased a bottle of chill tonic, the base of which is quinine. He went his way rejoicing, praising his patent preparation, to the utter discomfiture of his doctor.

Prophylaxis. In malarial cachexia quinine should be administered for forty days, preferably on a full stomach, say three to five grains *ter in dies*, to avoid tinnitus aurium and nervousness. After this, relapses may be prevented by 10-grain doses of quinine on the fifth, sixth and seventh days exhibited at bed hour.

This, it may be said, is applicable to all relapses, or rather the anticipation of same.

As to the use of quinine in hemoglobinuria or hematuria, I have only to state that I am investigating this as closely as I can. The last four cases I have treated have been given quinine hypodermatically, with three recoveries. I hope to give a fuller report a year hence.

DISCUSSION.

DR. L. H. WARNER, of Brooklyn, N. Y.—Dr. Burns makes the very bold statement that a fever which does not yield to quinine is not malarial. Quinine is only a poison to the full-grown parasite, but does not attack the spore, consequently, if given for even thirty or forty days, the germ is killed and the spore escapes, oftentimes lying dormant for years. It is a fact, and the American Text-Book on Physiology bears out the statement, that the amount of chlorides in the blood substance, as well as in the plasma, exceeds the amount of sulphates and carbonates together. The parasite attacks the red blood corpuscle and destroys it. Now, if, when there is a superabundance of chlorides, the germ is destroyed, we must use chlorine, and it will destroy not only the parasite, but its spore as well. I have had the opportunity to observe cases coming from the hotbeds of malaria in Italy. They were dosed with quinine up to forty grains at a time, without affecting the growth of the germ, but as soon as they were put under treatment with quinine simplex, plus chlorine, of chlorine plain, there was no organism. I think that chlorine is one of the most important factors in the treatment or malaria, but quinine plain must be used and not the sulphate.

DR. T. B. GREENLEY, of Meadow Lawn, Ky.—In the good old times they did not give quinine at all until the fever was modified. The patients were bled, purged and salivated, but no quinine was given until the fever declined. Many patients were at this stage very far gone, and I finally came to the conclusion that, if quinine was good for fever, it was good when fever was on as well as when it was off. I first relaxed the bowels with rhubarb and then administered quinine. I remember losing only one case from July until Christmas of one year, and that was one of the congestive variety. I believe in giving quinine during the fever stage, and I have never had one case which I could not manage with quinine.

DR. L. H. WARNER, of Brooklyn, N. Y.—I have had cases of typho-malarial fever where I found the quartan malarial parasite as well as the typhoid bacillus present. The man died, and the question arose as to how to make out the death certificate. I believe that there is a disease, under conditions such as were prevalent during the recent war, and also during the civil war, in which there is a combination of these two germs, and where the term typho-malarial fever would be the proper one to use.

DR. BURNS (closing discussion).—I am surprised at Dr. Warner's lack of information as to the method of spore formation in the protozoa of malaria and the action of quinine on same. Spore formation, as I take it, is a kind of multiple fission common among protozoa in which the organism breaks up into a number of pieces of spores, each of which eventually develops into an organism like the parent form. Now the length of time required for the development is only a few hours—twenty-four to forty-eight hours for the estivo-autumnal, forty-eight hours for the tertian and seventy-two hours for the quartan parasites.

The doctor says that quinine kills the full-grown parasite, and the spores, escaping the parasiticidal action of quinine, may lie dormant for years. It would appear that he has the cart before the horse. The rudiments of our investigations in malaria teach that the hyaline forms (spores) are least capable of resistance to quinine, and the full-grown (endoglobular) forms are retarded or not affected at all. But the period of existence of the endoglobular (endospores) forms is a very brief one, eight hours at the most, I believe, and at the period of sporulation they become extra-globular—spores, hyalines or young parasites. Golgi, Laveran, Bacelli, Dock, Osler and Thayer are clear on these points.

The question of latent malaria is admitted, but it is not the spores, *per se*, which lie dormant. Segmentation or sporulation occurs, and in forty-eight hours a full-grown body; the cell action goes on repeatedly, but by phagocytic activity or immunizing power of the blood a paludal explosion or chill is precluded.

Now then, I believe that if we take our patients out of a malarial climate and administer quinine judiciously, even that which is latent may be eradicated. I think it is practically immaterial what preparation of quinine is used; it is the base that does the work.

With the thalleioquin test we are able to recover the alkaloid in the urine; and for the present it suits our purpose to consider that the alkaloid is set free in the blood. Granting that the chlorides and chlorine are parasiticidal in their action, I question very much whether the doctor would be able to get free chlorine into the blood. It is an irrespirable gas, and when applied to the skin is followed by erysipelatous or pustular inflammation. Given in weak solutions in the form of Sir Thomas Watson's solution, Labarrague's solution or aqua chlori diluted, in either case chlorine would reach the blood as a chloride.

In all acute febrile conditions the chlorides in the urine are diminished, and consequently increased in the blood, for

a time at least. Apropos of Dr. Warner's process of reasoning, a man should have salt enough to save himself consequent upon a chill and fever.

With reference to those cases in our recent war with Spain, Dr. James Ewing, of NewYork, detailed by Surgeon General Sternberg to make blood examinations at Camp Wikoff, bears me out in his report of 800 cases. I believe he states that, in spite of very painstaking effort, the attempt to find a case of typhoid fever and active malaria progressing simultaneously was not successful. He found one case that showed tertian organisms on the first two days before typhoid fever was suspected, which disappeared on the exhibition of quinine and were not seen again, the patient dying with peritonitis in the fourth week. Two others are reported as running a typhoid course, and in the second week of convalescence tertian organisms are noted. He concludes that typhoid fever is largely incompatible with malaria, and that during the course of typhoid fever, if malaria is latent, it is usually suppressed.

I have seen only five cases of so-called Cuban malaria, but all responded to quinine as readily as the Arkansas variety.

XXXI. THE TREATMENT OF PULMONARY TUBERCULOSIS BY THE INHALATION OF ANTISEPTIC NEBULÆ.

BY HOMER M. THOMAS, A. M., M. D.,
CHICAGO.

At the Louisville, Ky., meeting of the MISSISSIPPI VALLEY MEDICAL ASSOCIATION, in 1897, I had the privilege of presenting microscopical proofs of the penetrability of vaporized medicaments into the pulmonary alveoli. Previous to that time all text-books on this subject stated that it was not possible for nebulæ to reach beyond the smaller bronchial tubes. A demonstration of the fact that nebulæ *do reach* the pulmonary alveoli raises the question of their efficacy in the treatment of pulmonary phthisis. Work demonstrating the value of

this form of medication in the treatment of pulmonary tuberculosis has been going steadily on until the present time.

It is the purpose of this address to present such clinical facts as have been obtained through the use of this special form of medication in the treatment of pulmonary phthisis. There is no specific treatment of this disease. Cures are reported upon every hand through the media of many agencies. The disease being a complex one in its varied manifestations, each case should be treated upon such special lines as are individually indicated. The basis of all successful treatment is in the maintenance of nutrition. As a corollary to this is the influence of selected climate, judicious exercise, rest, baths, internal medication, and all other collateral agencies which stimulate vital resistance.

Having surrounded each case with the essential conditions for repair of the pulmonary lesion, what relation does the inhalation of antiseptic nebulæ bear in the rôle of cure?

The answer to this query involves a consideration of the pathological basis upon which nebulization of antiseptic medication rests. It is proven beyond doubt that these nebulæ penetrate through the ramifications of the respiratory tract wherever it is possible for air to go. The first question to determine, then, is whether the medicament can reach the origin of the disease. The second problem is, will it prove effective when the origin of the disease has been reached?

The air vesicle route is the rational one, since tubercle bacilli are discharged through the air, and are found in the sputum. The absence of general infection in curable cases shows that the possibility of connection with blood vessels is not large. All inflammatory areas are areas in which the mechanism of extra vesicular interchange is materially interfered with. Large numbers of tubercle bacilli are discharged by the air vesicles. Few get into the blood or lymph current; therefore the air vesicles must be in closer touch with the tubercle bacilli. The presence of large quantities of pigment from the air around tubercular areas shows that considerable absorption through the lymphatics from air vesicles is possible. A nebulized antiseptic having reached the area beyond the limit of current finds a greater probability of falling on the epithelial covering, and of being absorbed from it than if

it reached only to a zone of current, for in such an extra-current area no force is operating save gravity. On reaching an extra-current zone nebulized antiseptics fall on squamous epithelium and encounter active phagocytic cells. In a zone of current they fall on ciliated epithelium, and are wafted to the outside. These mechanical laws hold good whether the foreign body be tubercle bacilli, dust, or oils in suspension.

Since this is true of healthy lungs, is it true when we speak of tubercular lungs? Nebulized antiseptics suspended in the air will reach the cavities and air vesicles of tubercular lungs just as well as if these lungs were healthy. But where there are considerable zones in which the air vessels are obliterated, these areas are necessarily very difficult to approach from the side of the air vesicle. Oil globules falling in the air vesicles of the neighborhood are picked up by the phagocytes, absorbed, and, finding their way into the lymph and into the blood, reach these masses of tubercular overgrowth with as much readiness as they can be reached in any other way. It is true that the presence of large areas without air makes access through air routes very difficult. Admitting that encapsulated tubercular foci can not be reached by nebulized medicaments, is there any known therapeutic agent which can reach them? None that I know of. Nature has walled off these encapsulated tubercular foci by connective tissue barriers, and in that way makes an effort to effect a cure. It, therefore, follows that the most rational way to treat locally these tubercular encapsulated foci is to attempt to render antiseptic their contiguous areas.

The pathologic conditions we have to deal with are those of lowered vital resistance in the lung tissue; development of tubercle bacilli; hyperplasia of fixed cells; formation of epithelioid cells; development of knot-like foci where the tubercular bacilli multiply; giant cell formation, in which there is no new capillary formation; inflammation; degeneration of the blood vessels, lymphatics and air passages.

That antiseptic nebulæ have a beneficial influence on the parts of the lung they reach there is no doubt. In such places the laws of osmosis and dialysis unite to aid in the prevention of new invasion. That these antiseptic nebulæ do not reach the encapsulated areas is no argument against

the efficacy of this method of treatment, for neither can these areas be reached through the blood nor the lymphatics, by antitoxins or any method of hemotherapy, for no blood vessels or lymphatics reach these walled-off foci. Therefore our therapeutic resources are confined to persistent efforts toward preventing an extension of the tubercular processes.

What is the scope of nebulization? 1. Control of cough. 2. Relief of dyspnea. 3. Intimate contact of antiseptic nebulæ upon 1,400 square feet of respiratory capacity. 4. Inhibition to the extension of tubercular foci.

The advantage of controlling cough by inhalation rather than internal medication is self-evident. By bringing to the inflammatory areas through direct contact specially adapted formulas of expectorant or anodyne combinations, you allay many or all of the distressing symptoms from cough.

The relief of dyspnea incident to the blocking of the larger or smaller tubes by catarrhal products is often marked. By means of expectorant types of nebulæ this, as a rule, is readily accomplished.

To properly use the antiseptic nebulæ in the treatment of pulmonary phthisis, it is essential that an abundance of compressed air be supplied at a steady pressure of from 15 to 30 pounds to the square inch. The air should pass through a series of antiseptic chambers which entirely free it from all impurities. When it is purified and then compressed, a final measure of purification should be given by its passage through the oil of cloves. In cold weather it is better that the air should be heated to a temperature of 60° to 70° F. before using for the purpose of producing the nebulæ. Given an abundance of air that is properly prepared for use, a well devised and constructed nebulizer is placed at a point convenient for the patient's use. In this nebulizer a variety of formulas can be used; the selection of the special combination suited to each case will depend largely upon one's experience in the use of this form of medication, and upon a close study of the physical findings in the chest of each patient. Where it is desired to relieve cough a mixture containing the tincture of stillingia and beechwood creosote, with lavolin as a base, is quite often efficient. For the relief of the dyspnea which so often arises from a catarrhal blocking of

the tubes, both large and small, expectorant combinations with carbonate of ammonia, syrup of scillæ, syrup of pruni Virginianæ, with lavolin as a base, often give marked relief. Should the case be one in which there are especially urgent symptoms to relieve, and where there is general toxemia from the disease, recourse should be had to the use of the well known and tried antiseptics. Nebulization of eucalyptus, oil of cloves and beechwood creosote have been often effective. A mixture of 10 per cent. iodoform in solution with sulphuric ether and lavolin has been found very valuable. Frequently the use of pure Ceylon cinnamon oil in solution, with lavolin as a base, in a preparation of about 10 per cent., is an excellent stimulant for the bronchial mucous membrane.

Whilst all of the foregoing are standard antiseptics and have their range of usefulness in individual cases, it has been found that they do not inhibit the growth of culture media, hence nothing pathologically curative can be claimed for any of them. They are useful more for the relief of symptomatic conditions than for curative results. We have, however, at our command one antiseptic, a powerful germicide, from which there is reason to feel hopeful that valuable results will be secured in cases of pulmonary phthisis. This antiseptic is formalin. It has been found by experiment that culture media, placed in an atmosphere saturated with a respirable solution of formalin, are markedly inhibited, and in some cases entirely arrested in their development. With this fact upon which to estimate the antiseptic value of formalin, we feel justified in claiming it to be our most valuable remedy in the treatment of pulmonary tuberculosis by inhalation.

In using formalin I begin with a 4 per cent. solution of the 40 per cent. aqueous commercial solution in water. This is placed in the nebulizer and violently agitated by means of compressed air. I do not nebulize this solution, but favor evolution of the gas through a mechanical mixture and agitation due to the pressure of compressed air. In a short time cases develop and acquire an increasing tolerance for the formalin mixture, and by degrees its strength can be increased from 4 per cent. up to 20 per cent. One invariable rule should be observed in the use of this therapeutic agent—

and it applies with equal force to those previously mentioned —to instantly cease their administration as soon as cough ensues. By pursuing this plan the tolerance of the patient is readily secured, and the time in which nebulization can be administered correspondingly lengthened.

There has within a year been established in this county a hospital devoted exclusively to the treatment of consumptives. This building is completely equipped with chemically pure compressed air, abundantly distributed, and the treatment of pulmonary phthisis by nebulization is there extensively used. I have records of a number of cases treated there since the 21st day of February, 1899, and desire to call your attention to some of the results secured from treatment. All of the cases were in the second and third stages of phthisis. They numbered 50, all males. Of these we have a gain in weight among 15 of the 50, averaging from 2 pounds to 12 pounds; a loss in weight among 30, and in 5 cases there was neither loss nor gain in weight. When we reflect that the patients coming to this institution were in the worst possible condition of general health, all suffering from advanced tubercular processes in their lungs, that the food supplied is of poor quality, and in every case inadequate to the proper nourishment of the patients, I feel that the showing made in the short time elapsing from February 21st to August 15th is a very creditable one. I am quite aware of the inaccuracies that statistical statements may lead one into; I also appreciate the errors of deduction that one may easily make from such a general aggregation of cases, but I feel warranted in asserting that a very large proportion of the improvement, 40 per cent., obtained in the number of cases enumerated has come from the persistent saturation of their respiratory passages with antiseptic nebulæ.

As far as the work has progressed, it certainly opens up a vista of therapeutic possibilities. As I have already stated, a lung with a tubercular process shows an immense amount of newly formed connective tissue. This is an effort on the part of nature to wall off the pathological process. If nature is successful, there is nothing left but scar tissue, the tubercular process is inclosed, and the patient recovers. If nature does not succeed secondary mixed infection takes

place, we have sepsis, and the patient dies. There is only one cure; that is by walling off the tubercular process by embryonal tissue. In my experience I am led to conclude that medicated vapors are of great value in favoring such a process. Nebulization always did and always will occupy a secondary place in the treatment of this disease; its function is that of a supportive rôle rather than the development of curative properties, *per se*. We should remember that in advancing infection with the tubercular bacillus it is the vital resistance of the cells and the possibility of the reproduction of embryonal tissue which we must try to secure. How much any treatment assists these processes it is difficult to say, but only along the lines of such assistance can success be reached. The treatment is not necessarily an effort toward the extermination of tubercular germs, but the stimulation of the cellular structures of the system, by which the patient may resist invasion of the germs as well as the toxins which are manufactured and thrown out by the germs themselves.

There are many mechanical methods for the introduction of antiseptic nebulæ into the respiratory passages. A double glass tube, so constructed as to occlude the anterior nares, will enable the patient to inspire freely through the nasal passages. The nebulæ can be admitted by a single glass tube held between the lips slightly compressed, and inhalation will take place through the mouth, as well as an admixture of atmospheric air through the nares. The preferable method is the use of a pure gum rubber funnel top, such as is used for lavage of the stomach. This funnel top is readily adjusted to all the irregularities of the facial contour, and very little of the nebulæ escapes during its use. With this contrivance deep inspiratory efforts can be made simultaneously through the nares as well as the oral opening. The period of deep inhalation should be regulated by the easy tolerance of the patient to the nebulized medicament. Cough is the only warning sign which should cause us to desist for a greater or shorter length of time in the use of the nebulæ. With increasing use on the part of the patient, the time of contact of the medicament with the respiratory passages can be greatly lengthened. Again, the nebulæ can be respired directly from the exit opening of the nebulizer. This is a

good way for those commencing the treatment, as the larger admixture of atmospheric air renders the deep inhalation of the nebulæ less irritant.

As a supersaturation of the respiratory passages with these nebulæ is the desideratum aimed at, the whole atmosphere of the room in which the patient is placed should be completely filled. Under these conditions every respiratory effort carries into the lungs a greater or less amount of the nebulized medicament. So complete is the supersaturation attained that the expectoration of tubercular patients often has the characteristic odor of the medicament nebulized. The perspiration from the skin will also have this odor, and the ammoniacal odor of the urine is frequently lost in the characteristic smell of the nebulized medicament.

The adaptability of this form of treatment for individual use of patients in their homes is very wide. A great deal of mechanical ingenuity has been shown in efforts made to easily produce a large volume of compressed air for nebulization. Beginning with the small hand bulb, nebulization is only secured in a very inefficient and interrupted way. Passing from that primitive form up to the use of pumps, an almost infinite variety of mechanism has been devised. There is the hand pump, which is tiresome, and at best can only be operated for a comparatively short time. Then there has been an effort made to reduplicate power by means of long lever pumps, rotary and circular. The most feasible and practical means of obtaining compressed air for nebulization in localities where there is water supply to the homes is in the use of the mechanism known as a compound pump. This pump is cylindrical in form. The water enters at the bottom, and through a system of valves the pressure of the water operating upon the valves efficiently compresses the air and forces it out through the opening, from which it is conveyed into the reservoir for use. The usual water pressure is from 16 to 25 pounds to the square inch. By the use of compound pumps the pressure may be increased to 35 or 40 pounds.

Should it be desired to take up nebulization to a considerable degree for the treatment of phthisical cases at home, facilities for the easy entrance of air into the pump are

necessary. One of the first points to remember is to take the air from the highest point possible in the vicinity of the home, so as to get it as free from surface contamination, odors and gases as possible. In order to do this, after the piping has been placed at the highest point there are put at the outer end two or three screens varying in increasing fineness, so that the air is mechanically filtered through the screens, preventing the ingress of any dust or solid impurities with the air. When the air is mechanically filtered and compressed there should be placed an antiseptic chamber for the purpose of holding in suspension some antiseptic oil, as oil of cloves or oil of wintergreen. After this purification has been secured, the air is then ready for piping to any portion of the home where its use is desired. The plumbing connections should be made at the point of entrance of the water to the home, preferably in the basement, for the higher you carry the pump from the basement the greater the corresponding decrease in pressure. An apparatus such as I have described can be placed for about $100.

While the inhalation of antiseptic vapor is not a specific for tuberculosis of the lungs, yet it plays an important rôle as a supporting means to other methods of treatment. There can no longer be doubt of the penetrability of properly compounded and vaporized medicaments. Their value in the treatment of pulmonary phthisis is largely determined by the medicament used and the amount respired. Clinical experience has proved their value. The weakness of this method of treatment lies in the therapeutic action of the medicaments at our command, rather than in the mechanism for vapor production. Chemical researches of the future, we hope, will yet bring to our aid more powerful antiseptics than those now available; powerful in their selective antagonistic action upon the pathological conditions of pulmonary phthisis, and yet harmless in their effect upon the healthy structures of the respiratory passages. We are strong in mechanism, weak in therapeutic resources.

I believe the chances of successfully coping with pulmonary phthisis are greatly enhanced by the general adoption by the profession of the inhalation method. It makes possible the creation of a sterilized atmosphere for respiration

by patients in their own homes. Too long has the profession been under the shrewd and often unscrupulous domination of those interested in the "commercialism of climate." In many instances incurable cases have been sent long distances from home, at great expense as well as bodily discomfort, allured by false hopes of the climatic cure of phthisis. Prominent specialists in localities supposed to have great virtue in the cure of this disease have reaped great financial rewards from the credulous faith of the incurably sick; and when at last the fallacy of such hopes has been demonstrated the excuse is given, they came "too late," and, would they die at home, must return at once. No intelligent physician can deny the value of altitude in the treatment of selected cases of phthisis, but the great rank and file of these sufferers leave the comforts of home to share the discomforts of a residence away, when their disease is equally amenable to home treatment. I plead for greater discrimination in the selection of cases that leave their home climate for often an elusive hope of benefit in other altitudes. With our more intelligent appreciation of the causative factor in the production of this disease, with the valuable curative agencies we can surround our patients with at their own firesides, and with the additional compensation that if cured at home they can forever remain there, we should use conscientious discrimination as to where and when we send our tubercular patients. While assiduously working to cure by any means in our power, let us not neglect the broad field of the prevention of tuberculosis.

There is every probability that the absolute extinction of tuberculosis from the world is not far distant. It is inevitable that when the race becomes fully cognizant of the dangers from tuberculosis and the simple measures necessary to stamp it out of existence, they will arise and forever make this scourge a thing of the past. Most hopeful is the outlook for the accomplishment of this great result. Not alone are the masses awakening to the needs of the hour, but those in high places, even royalty itself in England, is championing the cause of race emancipation from tuberculosis. Innumerable societies are springing up in every village, hamlet and city throughout the land; prevention, like

territorial expansion, is in the air, and so comprehensive is this reform in its scope that a great international conference for war on tuberculosis has recently held sessions in Berlin. Let us all do something to restrict this disease, so that with the dawn of the new century we may hope to see the tuberculosis problem solved by the most humanitarian methods, thanks to the combined efforts of physicians, health officers, statesmen, philanthropists and the good will of an intelligent people.

DISCUSSION.

DR. T. B. GREENLEY, of Meadow Lawn, Ky.—The paper is an excellent one, and I sustain Dr. Thomas in all the points he has made, with a few exceptions. In the last three years I became satisfied that we needed something more than we had in the treatment of pulmonary tuberculosis, as we could not control the growth of the bacillus which is the cause of the disease. In using the formaldehyde I found it was impossible to get a sufficient quantity inhaled to enter the circulation so as to make the system immune. I found by adding a small quantity of ammonia to the nebulæ the patient would bear a good deal more of it, and even then I could not make the system immune to the disease, but I was on the right track, as I was able to demonstrate satisfactorily that we could do something to check the action of the bacillus. I manufactured the formaldehyde ammonia myself for a number of years, until I found it on the market in the shape of urotropin. It is borne internally very well, and I use the inhalation of formaldehyde quite largely as a preventive of autointoxication from the swallowing of more or less of the sputum, which all patients will do. I next found that by giving large quantities of urotropin the system would, inside of ten or fifteen days, be thoroughly disinfected, so much so that the sputum is free from the bacilli, thus leaving nothing but a simple ulceration. I continue my treatment, using all the remedies which the doctor has spoken of to build up the system, with the result that the cavities heal without much difficulty, and my patients are rapidly on the road to recovery. The patient has a good appetite and the swollen glands disappear rapidly. Even in tuberculosis of the bone urotropin is very effectual, and I have several cases now under treatment which are yielding readily to this drug. In all my cases of pulmonary tuberculosis I use a preparation of theobromine with iodine, and massage every day, morning and evening. I continue its use until I get the reaction of iodine in the secretions, and find that

cavities of the lungs heal much more readily by this means. The great remedy is formaldehyde and ammonia, and is the one remedy which I found to thoroughly and completely disinfect the system and at the same time be well borne by the patient. I have used it in several hundred cases, and I recall one especially which had a very large cavity, and today he is walking around in good health, with all cavities healed except a very large one, and that is healing very rapidly.

Dr. Charles L. Minor, of Asheville, N. C.—It seems to me there must be some misunderstanding on the part of Dr. Greenley in regard to his new combination, as we have been taught that a combination of ammonia and formaldehyde destroys the formaldehyde, consequently the doctor can not ascribe his results to the inhalation of formaldehyde. Regarding Dr. Thomas' paper, I am very glad to see that, like many who have advocated inhalation, he advocates it only as an adjuvant, as the tendency of all modern thought, that in hygiene and dietetics we can see our real results of cure, is in the main true. Encapsulated tubercular foci can not be reached, but much can probably be done by keeping down the tendency to bronchitis. The great difficulty is in giving solutions weak enough so as not to cause great irritation, but I find by experiments in patients who inhale the air around them only, results as beneficial as though they had inhaled medicated vapors, and there is no possibility of setting up any secondary process through the irritation of the medicament.

Dr. Joseph M. Patton, of Chicago.—I think Dr. Thomas is to be congratulated on the conservative view he takes of the therapeutic effect of this means of medication. The inhalation of different medicaments has been adopted for many years, in various ways, as a curative agent for tuberculosis. The injection of different oils into the trachea has been tried, the free administration of beechwood creqsote, and so forth, but none of these measures seems to have given any definite results as far as curative measures are concerned. It is very evident, when we stop to consider the pathological changes which take place in a tubercular lung, that little is to be expected in a directly curative way of this form of medication. Even if the tubercular area were open to contact with the outside air, the collateral zone of congestion, which Councilmann has demonstrated to be present, and in which we find no bacilli, and in which the circulation is just sufficient to admit of absorption and poisoning, would pre-

vent the inhaled medicament from reaching the cavity. As far as reaching them through the circulation and introducing enough medication in that way to act as a preventive to the development of the tubercle bacillus is concerned, I think the general failure of this method shows that it is a futile one. Summerbrodt showed that loading the blood with creosote really produces but little beneficial result. I do not wish to be understood that no good can come of these measures, as I believe good results follow the treatment the doctor has indicated. The cough is lessened, there is also diminution of the bronchial secretion, there is a general improvement in the respiratory function, and the danger of secondary localization is particularly lessened. Any one who has treated cases of chronic bronchitis by means of vaporized medicaments will know that they are productive of good results. Anything that will diminish bronchial secretion will correspondingly lessen the danger of secondary localization, and I think that this is certainly a strong feature to recommend this treatment. I practically endorse all that the doctor has said, but I think that his candid admission of the possibility of considerable good arising from the absorption of the nebulæ through the bronchial mucous membrane is rather illogical.

DR. THOMAS (closing the discussion).—It is gratifying to me to hear of the results which Dr. Greenley has had from the use of formaldehyde and ammonia. We can not rightly claim anything more for inhalation than its being an adjuvant in treatment. Another value it has is that it excites deep breathing. It creates an immense psychical impulse, which we do not have when breathing air alone, as patients can see something come out and something go in, and this is of importance, because most phthisical cases suffer from impaired respiration. Bearing in mind this psychical effect, you can see that there is a vast field for therapeutic possibilities in this form of medication. I think we are strong in medication, but weak in therapeutics, and I hope that the gentlemen who are active in chemical research will yet find this to be true. Some agents have a salutary effect on the tubercular process in the lung, and are at the same time harmless to those areas which are not infected.

XXXII. THE TREATMENT OF ACUTE LOBAR PNEUMONIA.

BY RAMON F. GARCIN, M. D.,
RICHMOND, VA.

Acute lobar pneumonia is, to the writer of this short article, one of the most interesting diseases to be met with in the whole realm of disease. The statistics, as regards its frequency, death rate and relative occurrence at different ages, are so well known to the members of this Association that it is entirely superfluous to mention the same.

I wish, before beginning the subject proper, to report a case that occurred in my practice.

May 5, 1899, I was called to see Walter R., age 6; saw him at 6 P. M.; temperature, axillary, 104¼°; dullness over middle and lower right lobes, and cough; diagnosis, acute lobar pneumonia. He progressed fairly well and was discharged at the end of two weeks as cured. Some two weeks subsequent to this was called to see the same child, because of an evening temperature, loss of weight and symptoms indicating pleuritic effusion. A careful examination showed this to be undoubtedly true. Resection of the rib and the removal of over a pint of pus was subsequently performed, my friend, Dr. Lewis C. Bosher, assisting me materially. A rapid and uninterrupted recovery was made. The treatment of this case consisted in the usual diet for such cases, strychnia, ammonia, and locally, turpentine, flaxseed jackets, with the oil-silk coverings, and iodine.

In a paper on this subject, read by me before the Richmond Academy of Medicine and Surgery, February 10, 1897, I took the position, founded on over ten years' experience, that blistering, properly used, is the treatment. The time to use a blister is, in my opinion, during the first stage, or at the beginning of the third stage. At other times it is undoubtedly a torture and a source of harm.

I desire to say, in the way of criticising the case mentioned, that I regret blistering was not used. Owing to de-

bility it was thought best not to do so. Later effusions would probably have been thereby prevented.

The remedy which is of greatest value is, without doubt, strychnia, the nitrate, preferably, pushed, as needed, to the full physiological effect. Next is ranked ammonia, either in the form of the aromatic spirits, or the carbonate, and to gain any effect large doses must be employed.

When indicated by conditions present, tincture of aconite root is especially valuable, combined, as needed, with other agents. Inhalations of oxygen have proved of apparent benefit in several cases in which it was employed.

As regards diet, the liquid peptonoids, with creosote, is the ideal food theoretically, and my clinical experience proves that such is the case practically. It is simply invaluable. Milk, of course, clam broth, and Valentine's meat juice are all valuable.

When convalescence is fairly established suitable tonic agents should be employed, especially cod-liver oil. The freshly prepared emulsion is decidedly preferable to any of the proprietary articles.

As regards local treatment, outside of blisters, I believe that ice will prove of service, if used in the beginning of the first stage, but it is my honest conviction that, used indiscriminately, it is responsible for many deaths. Iodine, especially Churchill's, is also of value, when only a certain amount of irritation is desired.

The local treatment, in children, resolves itself, mainly, into the employment of poultices, flaxseed meal, mustard and cotton batting jackets. I have not time to do more than mention them.

Some competent authorities report good results from the use of "serums." Personally, I have had no experience with any agents beyond those mentioned, varying slightly, as circumstances may determine.

XXXIII. TYPHOID FEVER IN VERY YOUNG CHILDREN, WITH A REPORT OF THREE CASES, WITH UNUSUAL COMPLICATIONS.

BY E. B. MONTGOMERY, M. D.,
QUINCY, ILL.

No subject is of greater interest to the general practitioner than that of typhoid fever. Like the poor it is always with us, and in the United States, at least, with the exception of tuberculosis, it is the source of greater mortality in our larger cities than any single ailment with which the medical man has to deal. According to statistics collected by Dr. F. S. Crum, and published in the *Medical Record* for August 12, 1899, during the past ten years in the twenty-four largest cities in the United States, the total number of deaths from this cause alone has been 41,931, representing not less than 600,000 cases of this preventable disease. Occurring at all ages, and giving rise to numerous complications and sequelæ, surgical as well as medical, no one subject has been the occasion of a greater amount of study and research, or has a more abundant literature relating to all its phases. The two cases which inspired this paper were of interest to me as occurring in children, and as presenting complications not frequently found at this period of life. Indeed, cases in the first year of life are exceedingly rare.

Dr. J. C. Wilson[1] quotes Murchison as showing as a great rarity to the London Pathological Society in 1864 the intestines of an infant, six months old, who had been attacked by the disease at the same time as her mother. Holt[2] has never seen a case in a child under 2 years of age, and he quotes Northrup's report of 2,000 autopsies on children, in none of which were any typhoid lesions found under that age. Lartigau[3] and others, however, have reported cases of typhoid fever in which the Widal reaction was obtained and the bacillus typhosus was demonstrated in the spleen and mesenteric glands, and yet the autopsy revealed absolutely no intestinal lesions. Ashby and Wright[4] find it

very uncommon under 3 years, and Goodhart[5] had two patients under one year old with the disease, both cases proving fatal. Earle[6] cites a case of his own in an infant aged 24 months, in which death occurred from intestinal hemorrhage. He also cites a case reported in the London *Lancet* for January 2, 1892, by Ogle, in which the child was but 4½ months old, and quotes Murchison as having had three cases in infants under a month old. He further quotes Vogel as having had 7 patients under 1 year of age, Henoch as having had 8 under 2 years, and Montmollin 15 of the same age. A further case in an infant of 8 months is reported by England of Montreal. Donkin[7] thinks the disease extremely rare under 2 years of age, and Parrot, Friedleben, Bouchut and Jules Simon do not consider that the disease ever exists among nurslings. The Widal reaction would, of course, be of use in settling this question in doubtful cases. Dr. J. P. Crozer Griffith[8] has found this reaction in an infant born while its mother was still suffering from typhoid fever. The same writer in another contribution[9] says that an increasing number of cases is being reported in infants, and thinks that infected milk is the cause of many of them. He quotes Morse, however, as not having had a patient as young as 2 years among 284 children ill with the disease, and Bouchut as denying that it ever occurs among the newborn. Berg, he says, in analyzing 1,626 cases occurring in Curschman's clinic, found only 5 patients as young as 2 years of age, and Filatow found none so young among 106 cases in children up to 18 years.

From a paper by Dr. Stowell[10] on "Enteric Fever in Children," and one by Dr. Noyes[11] on "Enteric Fever in Infancy," read before the Section on Diseases of Children of the American Medical Association in 1895, I still further note the rarity of this disease in early life. Northrup is quoted as being skeptical of its occurrence in infancy, not one case having been observed in the New York Foundling Asylum in the twenty years of Dr. O'Dwyer's experience there, or in his own 12 years' connection with the same institution. The same report comes from the Nursery and Child's Hospital in New York, and Dr. Page, the resident physician in the Children's Hospital of Philadelphia, the largest service in the United

States, has never had a case there in an infant. Stowell, in his elaborate tables, only succeeded in collecting reports of 85 cases in children under 3 years of age. Since his report I note one case reported to the Washington Obstetrical and Gynecological Society, December 20, 1895, by Dr. Samuel S. Adams,[13] in an infant of 2 years, the child presenting very marked meningeal symptoms. Dr. A. D. Blackader[13] in a paper read before the American Pediatric Society in 1896 also reported a case in an infant 2 years of age, there being present, also, marked enlargement of the liver.

In the recently published book of Dr. Hare, "Medical Complications and Sequelæ of Typhoid Fever," I note many additional cases in children under 2 years of age not given in Stowell's tables. Dr. J. H. Lee,[14] of Cleveland, reports one case in an infant of 6 months, and O'Malley[15] 3 cases at 21 months, 3 years, and 6 years in one family. Boobyer[16] records an instance in which out of a family of 8 persons, 5 became infected through an infant aged 8 months. The child had been restless and had constant diarrhea, but the fact that it was suffering from typhoid fever was not recognized. Osler states that perforation of the bowels from this cause has occurred in an infant 5 days old. Sbrana[17] has treated 72 cases of typhoid fever in children in Tunis, and found in some of them the complications of meningitis, parotiditis, aphasia, orchitis and empyema. Hare maintains that in many cases in young children the disease is not correctly diagnosed, being often called "simple catarrhal fever," a term, he says, which covers a multitude of diagnostic sins. He calls attention to the fact long ago pointed out by Liebermeister that typhoid fever may occur in adults with mild symptoms and be so designated.

Case I.—J. L., female, age 9 months, of healthy parentage, nursing, but partly bottle-fed, began to sicken about February 26, 1897. She passed restless nights, awakening frequently with a sharp cry. She soon began to be fretful and restless through the day and her temperature to go above the normal, reaching 101.5° to 102° F. in the afternoons. Then vomiting of nourishment and water began, which continued entirely uninfluenced either by the frequency, amount, or character of the nourishment given. Some diarrhea then supervened along with the vomiting, there being from two to five stools a day,

attended by considerable pain and flatulence and some meteorism. With increase of pain and restlessness, the brain symptoms became more marked and strabismus and retraction of the head developed, in fact the entire symptom complex was that of meningitis. Her temperature meantime ranged from 102° F. in the morning to 103° or 105° F. in the evening. The cerebral symptoms increased, *tache cérébrale* became marked, and when not crying the little patient lay in a comatose condition. Finally convulsions supervened which left her apparently moribund.

I felt very sure that I had a tubercular meningitis to deal with and at this time gave an absolutely unfavorable prognosis. However, aided by a most excellent and determined trained nurse, the battle was still kept up, tepid baths given at frequent intervals, and such sedatives as potassium bromid given during the period of convulsions, and the patient breast-fed as soon as she was able to take anything in the way of nourishment. Her temperature gradually subsided, the enteric trouble lessened, the stomach became more tolerant, and one by one the meningeal symptoms disappeared, until on April 4th, about five weeks after the onset of the illness, the little one was fairly convalescent, though still very weak and emaciated. Dr. A. F. Rooney of Quincy, Ill., kindly saw the patient with me in the early part of the illness. At this writing, after a lapse of 2½ years, no more robust, healthy and well-grown child is to be found than this little girl, not a trace of the serious brain trouble having been left behind.

The first question in connection with this case is one of diagnosis. The Widal reaction was not obtained, the test at that time not being in general use. But there was, first, a continued fever of gradual onset and long duration, with no existing condition of the throat or lungs to account for it. Then there were present the gastro-intestinal and meningeal symptoms so frequently found in the typhoid fever of infancy. Dr. Rocaz[18] states that vomiting in this disease is frequent enough in children to be regarded as a part of the regular train of symptoms. Wilson says that vomiting occurs much more frequently in childhood than in grown persons, and may occur throughout the whole course of the sickness. It is more apt to be present in severe than in mild cases, and tends to increase the resemblance between enteric fever and tubercular meningitis, rendering the diagnosis for the time obscure.

Griffith says that vomiting is a frequent initial symptom. He quotes two cases of obstinate, uncontrollable vomiting in children suffering from this disease, reported by Moussous, lasting in one instance eight and in the other ten days almost without intermission, yet followed by recovery. He has himself seen one case, running a course rather mild than severe, in which the child at last developed uncontrollable vomiting which lasted for days and ended in death. Rotch[19] says: "In my experience typhoid fever in young children is the disease which, next to non-tubercular meningitis, is most likely to simulate and be mistaken for tubercular meningitis. We may also have considerable difficulty in differentiating tubercular meningitis from the non-tubercular meningitis, which may occur in the course of typhoid fever. The extreme cerebral congestion which at times arises as a symptom of typhoid fever may also add fresh difficulties to the diagnosis."

In my case the absence of leucocytosis was the only point favorable to the diagnosis of typhoid fever rather than tubercular meningitis. Noyes[20] gives the history of a similar case in an infant, aged 11 months, the infection being due to the milk used. The later history of this case followed a course which he says he has not found at all uncommon in recorded cases of typhoid fever in infancy, characterized as it was by certain symptoms which simulated meningitis. Along with vomiting and general irritability stiffness of the neck and opisthotonos developed, and irregular and convulsive movements of one arm and leg. There was not, however, as in my case, any coma nor the well marked *tache cérébrale*. Many other cases have been reported in children presenting a complete picture of meningitis complicating the typhoid fever, as one reported by Brown in the Montclair epidemic, in which there was great restlessness, tossing of the head from side to side, rigidity of the muscles of the neck, opisthotonos, strabismus, and hydrocephalic cry, in which there was complete recovery after twenty-eight days. Similar cases have been reported by Gerhardt, Simon, Rilliet and Barthez. Griffith reports a case which he calls "meningitic typhoid fever" in a child, which he thinks of rare occurrence. In this case the patient became unconscious and the *tache méningitique* became well marked on the abdomen; apyrexia was established on

the nineteenth day, followed by rapid recovery. In this case the presence of the Widal reaction cleared the diagnosis of what appeared to be a case of meningitis.

Keen,[21] while finding but two cases of meningitis recorded as a complication of typhoid fever, is inclined to think it more frequent than generally supposed. Hare,[22] however, says that Osler has recorded three cases in which he made autopsies in suspected typhoid meningitis and did not find true inflammation. He further states that Taupin, in 1839, found on autopsy that in the typhoid fever of children with meningeal symptoms the condition is one of effusion without hyperemia. He further quotes Hirt in his work on "Diseases of the Nervous System," to the effect that of all diseases typhoid fever is most likely to be mistaken for meningitis. He further shows the rarity of true typhoid meningitis by the fact that from 1855 to 1887 there are only five cases referred to in the Index Catalogue of the Surgeon-General's Office. Its rarity is still further shown by the fact that out of 2,000 cases in Munich only 11 are recorded in which the patients suffered from meningitis. In every case of true typhoid meningitis, so far as recorded, death has occurred. This, he says, does not possess great prognostic value, since an absolute diagnosis of true typhoid meningitis can not be made during life. Keller,[23] however, asserts that true meningitis in a child can be differentiated from typhoid fever with meningeal symptoms by the presence of "Kernig's sign" in the former, which is as follows: The child is placed in a recumbent position with the legs completely extended. Then it is raised to a sitting posture, when, if meningitis is present, the knees become flexed and can not be straightened out until the dorsal position is resumed. Hare does not consider the cases of Senn of Geneva, reported in 1825[24] as meningitis complicating typhoid fever in children, as really having been meningitis, but as only representing meningeal irritation.

Case II.—M. McC., age 3½ years, began to sicken with fever and general malaise May 16, 1897, her temperature ranging from 101° F. in the morning to 103° or 104° F. in the afternoon. Associated with this there was more or less vomiting and headache and rapid prostration. The vomiting was controlled after some days by the use of dilute hydro-

chloric acid in 5-drop doses, the excessive temperature by tepid sponging and the administration of muriate of quinin in 2-grain doses every four hours, and the pain, flatulence, and diarrhea by camphorated tincture of opium in 10-minim doses at intervals. Frequent sponging with cool or tepid water was made use of throughout the continuance of the fever. Her temperature continued to range between 102° and 104° F., until the twenty-third day, when a double parotitis had fully developed, and it ranged higher, and within a few days evidence of pus formation was present. On June 14th, the twenty-eighth day, Dr. C. E. Ehle administering the anesthetic, I freely incised and drained both parotid abscesses and kept them packed with iodoform gauze. The services of a trained nurse were invaluable in this case and largely contributed to its favorable outcome. The child's temperature remained high for some days, reaching 105° F., then gradually declined, reaching the normal about July 1st, the thirty-fifth day. Prior to the beginning of her illness she had already acquired a considerable vocabulary for one so young. During her illness she lost the power to utter a single word, and did not begin to talk again until July 14th, two months from the beginning of her illness, when she gradually resumed her accustomed speech.

Dr. Keen, in his work before quoted, has collected reports of but 75 cases of this complication in typhoid fever. In a tabulation of a very large number of cases made by Dr. Westcott, only 28 cases of parotitis occurred, 12 of them being bilateral, suppuration occurring in 7, the mortality being 30 per cent. Nine of the cases were in children under 15 years of age. It happened during the third or fourth week most frequently, but in one case, reported by Gilbert and Fournier, suppuration of both parotids occurred as early as the tenth day. Hoffmann[25] is stated to have met with suppurative parotitis in 16 cases out of 1,600 patients ill with typhoid fever, and that 7 of them died; ordinary parotitis occurred in 3 cases. None of the writers on diseases of children except Holt has anything to say of parotitis as a complication of typhoid fever, and from this as well as its general infrequency I assume that it is not often met with. Aphasia seems much more common; indeed Hutinel[26] tells us that it always occurs in children. In all of the cases mentioned recovery rapidly ensued.

By the courtesy of Dr. C. W. Rook, of Quincy, I am enabled to report another case of typhoid fever in a child aged 3 years, it not having been previously reported and having come under his care August 16, 1896. Dr. Joseph Robbins, of Quincy, saw the patient in consultation with him.

Stewart C., aged 3 years, had a continued fever with a range of temperature between 101° and 104° F., vomiting and diarrhea being present during the first week of the illness. On the seventeenth day swelling of the right submaxillary gland developed, which ended in suppuration. The abscess was evacuated, and subsequently suppuration occurred in the parotid gland of the same side. One week later, or on the thirty-third day of the illness, the child died, the elevation of temperature having persisted to the end.

I can find record of but three other cases in which enlargement of the submaxillary glands complicated typhoid fever. The first was in that of Hoffmann, in which the swelling began on the fourteenth day of the disease and in a few days ended in suppuration and the patient's death. The second is the one reported by Gerloczy, cited by Hare, in which the patient, a girl aged 14 years, suffered from typical typhoid fever, with swelling of the submaxillary glands of both sides. The third was one reported to the College of Physicians of Philadelphia by Dr. D. Milton Miller,[37] in which the swelling of the submaxillary glands of both sides began on the twenty-seventh day of the disease, and by the fortieth day had subsided without suppuration.

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DISCUSSION.

DR. J. O. MALSBURY, of Peru, Ind.—The principal part of the paper in my opinion seems to be the fact that typhoid exists in children under 2 years of age. I believe that we frequently have cases of typhoid in infants under 6 months, but that these cases are often wrongly diagnosed. In many instances they are termed catarrhal fever, especially so when the attending physician is at a loss to know what the actual trouble is. It has occurred in my own practice and when the family wanted to know what I meant, I would say that any irritation of the mucous membranes causes catarrh.

The diagnostic point in these cases is to watch well what is going on about you. If you have typhoid in the neighborhood, or if it has been in the family some months prior, look out. I had a case this last winter in which the mother was taken with typhoid first, and some time afterward an infant 6 months old developed a typical case, and got well just at the end of the third week. This is a good point for diagnosis.

XXXIV. LITHIASIS.

BY R. ALEXANDER BATE, A. B., M. D.,
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Lithiasis is a condition of malassimilation. It embraces those disorders of arthritism which are characterized by the formation of calculi.

Lithemia, or the arthritic diathesis, embraces not only lithiasis, but also those disorders of nutrition which are

attended by altered interstitial circulation in the various organs and tissues. Consequently lithiasis and lithemia are not synonymous terms.

Although lithiasis differs widely from the classical auto-intoxication of Bouchard, it may correctly be considered under the disorders of autointoxication, since the cause arises within from malassimilation, and not from extraneous or bacteriologic sources.

Possibly acute yellow atrophy of the liver is a type of the same self-developing poison as lithiasis.

The formation of calculi may take place in any receptacle which contains a more or less concentrated fluid secretion. Calculi have been found in the liver, in the gall bladder and the hepatic ducts, in the kidneys and their appendages—the ureters, the bladder and the urethra, in the pancreas and its ducts, salivary glands, prostate, tonsils, vermiform appendix, stomach, intestines, tissues of the body, blood vessels, nose, lachrymal ducts, skin and lungs.

Lithiasis is chiefly a disorder of adult life. It may occur, however, at any age; uric acid infarctions are found in the fetus, and "chalk" deposits obstruct the circulation of the octogenarian.

Heredity plays an important part. Excessive eating and drinking, with insufficient exercise, disorders of the nervous system, and all else that retards the process of oxidation favors lithiasis. Calculi are said never to occur in wild animals in a state of nature, and to be very rare in sailors and nomads. If the animal be confined in a menagerie, or the open air inhabitant imprisoned, calculi frequently develop. Thus, in the inherited diathesis, where the cells are incapable of completing oxidation, and in the acquired type, where an insufficient amount of oxygen is obtained, arrested retrograde metamorphosis permits the accumulation in the system of organic acids and other products of malassimilation. These products of malassimilation, chemical changes in the fluid secretions, the presence of colloid and other foreign material are the exciting causes of lithiasis.

In cholelithiasis the calculi are chiefly composed of cholesterine—a product of retrograde metamorphosis, held in solution in the tissues by lecithin, and in the circulating

fluids of the body by the alkaline salts, and the compounds of potassium and sodium with the fatty acids (Lyman).

So long as the bile remains alkaline the cholesterine is held in solution. If calcium be added to bile, it unites with the fatty and biliary acids to form insoluble salts no longer capable of holding cholesterine in solution.

Thus, as Lyman points out, the acid dyscrasia, or an excess of organic acids in the liquids and solids of the body, causes a liberation of basic calcium from the anatomical structures in which this substance is contained. Calcium thus put into circulation precipitates the cholesterine.

Biliary calculi are most frequent after the age of thirty-five. Females are affected three times as often as males. Pregnancy, menstruation, tight lacing, sedentary habits, and the increased frequency of osteomalacia among females render them more liable to the disease. According to Naunyn, fully 90 per cent. of the females affected have borne children. Pregnancy and menstruation favor the increase of organic acids in the system; tight lacing causes stagnation of the bile; sedentary habits lessen oxidation. Osteomalacia is a disease in which the calcium salts are put into circulation.

Loomis observed the frequency of heredity in this type of lithiasis; also the liability of gall stone colic to occur at the menstrual period. Haig showed menstruation was attended by uric-acidemia. The association of biliary lithiasis with the other disorders of arthritism has been generally observed.

The frequent occurrence of gall stones with cancer of the gall bladder is probably due to the stagnation of the bile, the addition of colloid material (the products of inflammation) and the presence of foreign bodies, all of which greatly favor chemical changes. Nephrolithiasis, like cholelithiasis, is most frequently associated with other maladies of the arthritic diathesis.

Renal calculi develop most often in adult life, but are found in the kidneys of both the fetus and the very aged. Males are affected more frequently than females, the proportion in adults being five to one. All of the disorders of arthritism in which uric acid is the organic acid accumulated show a decided preference for males. Gout frequently passes

through the males of several generations without the females being in the least affected.

There are several varieties of deposit in the kidneys produced by the separation of the urinary salts—the uric acid from the urate of sodium or ammonium, the lime deposits, the phosphate varieties, finally several kinds of calculi are made up of cystine, xanthin, indigo and urostealith.

These substances (either acid or salt) are precipitated in the nascent state by reason of the excess of solid material or deficiency of water in the urine.

The presence of a foreign substance facilitates crystallization, and calculi developing in the pelvis of the kidney usually have a nucleus of pus, blood, epithelium or pigment. Uric acid "gravel" is by far the most frequent form of nephrolithiasis. Uric acid is held in solution in the urine by the tribasic phosphates. If the urine becomes too acid, these triple phosphates are converted into acid phosphates, and uric acid is thus precipitated. As in biliary lithiasis, it can be seen the products of arrested metamorphosis are again at fault. Lyman says everything that favors the retardation of the nutritive processes tends to facilitate the deposit of uric acid within the urinary passages.

Pancreatic, salivary, tonsilar and prostatic calculi are chiefly composed of lime salts, either the carbonate or the phosphate. As previously stated, lime in a basic form has been put into circulation through an excess of organic acids in the system. Precipitation of these calcium salts takes place from an acid medium into the various alkaline fluids of the body. A diastasic, alkaline fluid similar to that secreted by the pancreas is found in the vermiform appendix. So it may be presumed that stones of the appendix are of identical composition and similar formation to the calculi just mentioned.

The deposit of calculi, in the form of the urate of sodium and the urate of lime in the various tissues of the gouty individual are directly due to the excess of uric acid in the system.

Pathologists universally agree that in this, the most pronounced manifestation of arthritism, the organic acids causing the disorder result from incomplete oxidation or

arrested retrograde metamorphosis. Calculi occur in the blood vessels in the form of phleboliths, composed of lime phosphate and sulphate and potassium sulphate (Moullin); and as atheromatous deposits, composed of cholesterine, fat granules and crystals of fatty acids (Loomis).

The rarer calculi are most frequently crystallizations about a foreign nucleus. While calculi in various portions of the economy are frequently formed upon a foreign substance, Ord and Carter have shown this has little to do with the real pathology of lithiasis. They found that a calculus was built up in two ways: either of well defined crystals, or a submorphous material, consisting of granules, spheroids and laminæ. They experimentally produced the crystalline form by permitting the rapid intermixture of two saline solutions through a colloid medium. And the submorphous type was produced by the two solutions intermixing slowly through the same medium.

Therefore it appears that lithiasis is dependent upon the systemic condition, and the local condition is simply favored by inflammatory changes and the presence of a foreign body.

The symptoms, sequelæ and differential diagnosis vary with the situation of the calculus, consequently they will not be considered here.

The prognosis likewise is dependent upon the local lesion. In general, however, calculi are likely to return unless systemic treatment be instituted. Their development is most frequent during adult life and in a subject of arthritism.

Surgical operations upon the chronically jaundiced are likely to be attended by capillary hemorrhages, owing to the altered state of the blood vessels. Death rarely results as the immediate effect of lithiasis. In many instances the symptoms are so obscure that calculi are first diagnosticated upon the *post-mortem* table.

Prophylaxis offers considerable hope. Prophylactic treatment embraces diet and hygiene. The diet must be free from those articles of food tending to produce an accumulation of organic acids in the system, in other words, the diet permitted in arthritism.

Hygiene embraces all means of increasing oxidation, as outdoor exercise, mountain climbing, sea voyages, baths and

massage; also the use of flannels, to prevent sudden chilling of the surface, arrest of the secretions, and the selection of a dry climate of even temperature.

In general, the medical treatment is also that of arthritism. The alkalies are useful to maintain the normal reaction of the secretions, and the salicylates, to promote their fluidity; both assisting in the elimination of the products of retrograde metamorphosis.

Pichi, hydrangea, dioscorea, chionanthus, Java tea, piperazin, polygonum, uva ursi and olive oil are classed as antilithics. Olive oil and dioscorea villosa have been of service in my hands in the treatment of biliary lithiasis, piperazin, urotropin and the salicylates acting best in nephrolithiasis. The use of the salicylates and the alkalies embraces the rational treatment of lithiasis.

XXXV. OBSERVATIONS ON THE SURGERY OF THE BRAIN, BASED ON CLINICAL AND EXPERIMENTAL EVIDENCE.

BY GEORGE W. CRILE, M. D.,
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Elasticity of the brain. Grashey has proven that the cerebral tissue is incompressible. The coefficient of compressibility is even less than that of water. In a series of experiments upon the elasticity of the brain by Horsely and Levy, they concluded that the recoil of the brain after a given compression was not at all proportionate to the height of the blood pressure at the time, but to the elasticity of the brain tissue itself. When the brain was subjected to a sudden pressure the recoil occurred within ten to thirty seconds after it, soon recovering its normal level. The recoil, however, was considerably dependent upon the height of the blood pressure.

On the effect of increased intracranial pressure. The immediate effect of increased intracranial pressure is not

marked until the brain is compressed from 5 to 7 per cent. of its volume. The effect upon respiration is earlier noted and more pronounced than that upon the blood pressure. There is first a slowing of the respiratory rhythm, then arrest; active expiration is affected, then active inspiration. The amount of pressure necessary to arrest respiration is somewhat dependent upon the height of the blood pressure; the higher the blood pressure the higher the intracranial pressure necessary to produce respiratory arrest. Even after arrest has taken place, if the blood pressure has increased, respiration may be resumed, and, in fact, the time when respirations were resumed could often be foretold by noting the rise of the blood pressure. After respiratory arrest had taken place, if the vagi had been previously severed, thus causing a rise in the blood pressure, respirations were sometimes renewed. In the presence of arrested respiration, if artificial respirations were produced, a rise in blood pressure usually followed and natural respiratory efforts appeared in the midst of the artificial.

The effect of increased intracranial pressure upon the heart was, first, a slowing of its rhythm, with sometimes intermission, then later a complete arrest. If the pressure was continued for a sufficient length of time, the cardio-inhibitory mechanism became exhausted and a very rapid heart action followed.

Pari passu with the increase of intracranial pressure, the blood pressure fell. In some instances there was a mechanical stimulation of the compressor action of the vasomotors, producing a temporary rise in blood pressure. As a rule, when the vagi were severed, allowing a very rapid heart action, together with the normal rise of blood pressure attending such section, the application of pressure upon the brain produced an additional rise in the blood pressure, which was still more increased by means of artificial respiration.

On the relation of the depth of anesthesia to the foregoing phenomena. The deeper the anesthesia the earlier and the more abruptly the respirations failed. Conversely, when the brain was under a considerable pressure, a less amount of anesthesia was necessary to reduce the animal to the state of so-called surgical anesthesia, while the effect of the increased

pressure of the brain upon the heart and upon the blood pressure was also dependent upon the depth of the anesthesia. It was not so marked in the case of the respiration.

Clinical. Since having performed the experiments leading to the foregoing observations, I have had ample clinical opportunities for verifying them. Whenever, as the result of a hemorrhage, an abscess, a depressed fracture, or other cause of increased intracranial pressure, the respiration, or the circulation, or both, are modified by such pressure, it is fair to assume that the brain has been subjected to a compression amounting to about 5 per cent. of its volume. The exceptions of this deduction would appear in cases in which the pressure is exerted more directly upon a part of the brain representing the functions modified. The elastic recoil of the brain is observed in cases of depression due to hemorrhage on the removal of the clots, on elevating depressed fractures and on evacuating abscesses. I have seen clinical proofs of the effect of increased intracranial pressure upon the circulation as striking as the experimental. There is scarcely any mistaking the slow full "pressure" pulse, nor the active inspiratory phase, and finally the whole respiratory action under pressure. The great significance of a rapid pulse alternating with a very slow pulse at comparatively short intervals is obvious. This signifies the dissolution or breakdown of the cardiac center. When this stage has been reached there is scarcely a doubt as to the fatal termination. Operative procedures undertaken under such conditions are nearly always fatal, as in addition to the foregoing the vasomotor center is nearly always exhausted. If the circulation of the skin is studied, it will be found that the vasomotor action is lost, or nearly so, and under no circumstances should an operation then be undertaken. Experimental and clinical evidences are in accord as to the statement that the respiratory center is far more sensitive than the cardiac center and gives an earlier indication of increased intracranial pressure. The expiratory phase of the respiratory act is first affected. In performing an operation upon the brain under the circumstances of an increased intracranial pressure, I usually detail an assistant, who is to administer artificial respiration in case of sudden respiratory failure so likely to occur in the administration of an

anesthetic before the stage of surgical anesthesia is reached. I also have hot water and pieces of ice at hand, so that the assistant may, in the process of restoring respiration, apply cold, alternating with heat, upon the abdomen and chest. Ice is a powerful inspiratory stimulant and heat a powerful expiratory stimulant. Thus the alternating of the two extreme temperatures stimulates both sides of the center. If respirations fail as above indicated, the operation should not be abandoned, but the skull should be opened with as much dispatch as is consistent with safety, the intracranial pressure relieved by cutting away a sufficient amount of skull, when normal respirations will almost certainly be resumed.

On the blood supply of the brain. Sherrington and others have been able to demonstrate the presence of vasomotor nerves in the vessels of the brain. It is probable that the cerebral circulation is wholly dependent upon the general blood pressure, and, inasmuch as the general blood pressure is very markedly regulated by the capacious splanchnic area, it is obvious that the cerebral circulation may be better controlled by modifying the blood supply of the splanchnic area than by any attempts at the modification of the cerebral circulation itself. It is true that, as a result of certain drugs, the amount of blood flowing from the veins of the brain is increased, but this increase is due to an increase in the rapidity of the flow through the cerebral arteries and capillaries.

On the immediate effect of traumatisms. I have been able to demonstrate experimentally that the first effect of a blow upon the skull, of compound fractures, of rapidly increased intraventricular pressure, of gunshot injuries, etc., is respiratory failure. Gunshot wounds in a large proportion of the cases produce sudden respiratory failure. Introducing a needle, connected with a pressure bottle at a considerable height containing normal salt solution, and allowing the fluid to rapidly fill up the lateral ventricles, caused an almost immediate arrest of respiration. In one gunshot experiment, the animal was killed by a pure respiratory failure and the ball did not even touch any portion of the brain, but passed close to the medulla. This structure was not even touched by the bullet; the circulation was but little affected. The concussion imparted was sufficient to permanently arrest

respiration. One of the earlier casualties in the Spanish-American war, in the navy, was that of a gunshot injury of the head. In the report of this case, the surgeon observed that respirations were arrested, but the heart continued to beat for some minutes afterward, and I wish to direct attention to the probable indication for administering artificial respirations as a first aid in brain injuries. It has been demonstrated experimentally and clinically that the respiratory centre is extremely sensitive, and that, if artificial respirations are supplied for a time, natural respirations may be resumed. It is well to bear in mind that when respiratory failure does occur natural respirations will be resumed earlier if blood pressure is increased, so that, even though the circulation has not reached a dangerous depression, it should be restored to its normal or even increased on account of the favorable effect upon the respiratory action.

On the cortical respiratory centres. It is true that electrical or mechanical stimulation of any sensitive nerve may produce a change in the respiratory action, increasing the respiratory tonus, sometimes the respiratory clonus, and nearly always the respiratory rhythm. This occurs under surgical anesthesia. There is in the dog an area of the cortex corresponding in man with the upper end of the supra-orbital sulcus, a stimulation of which produces a very marked increase in the respiratory rhythm. The animal, in fact, literally pants. An overinspiratory clonus is produced by a stimulation of the cortex at the olfactory bulb and tract. A well defined area for producing arrest of respiration is found on the outer side of the olfactory tract, just in front of the junction of the tract with the uncinate. There is in this portion of the cortex a well defined "arrest" area, which, when subjected to electrical stimulation, causes a complete arrest of respiration. The arrest takes place usually in the inspiratory phase of the respiratory act. Now, this area is in relation with the base of the skull, and it rests upon a portion of the skull which is not well protected by the so-called water bed of the brain; therefore in an injury of the brain in which the brain is thrown forcibly against the base of the skull this portion is likely to be injured, and may produce thereby a respiratory arrest due to a mechanical stimulation and injury of this

centre. In a case under my observation, in which a patient in falling struck violently upon the bottom of the hold of a vessel, producing very marked respiratory arrest, causing death in a short time, the autopsy showed that there was very marked laceration of the portion of the brain corresponding with the cortical arrest area just described. I am, of course, not certain as to whether the local or the general injury caused the respiratory arrest.

On the cerebellum. It has been only within recent years that the physiology of the cerebellum has been fairly well worked out. One of the most striking facts, both clinically and experimentally, regarding the cerebellum, is the remarkable compensation which may take place after injuries and in disease. Luciani and Russell have shown that an animal may live after the ablation of the entire cerebellum. Owing to the remarkable range of compensation, clinically, the absence of characteristic cerebellar symptoms must always be borne in mind. Extensive disease of the cerebellum may exist with but little clinical evidence. The effects of the removal of the lateral lobe of the cerebellum are the following:

(*a*) There is a *strabismus*, such that the opposite eye is directed downward and outward, while the eye on same side as the lesion is little, if at all, deviated.

(*b*) The consequent *nystagmus* is such that the lateral jerks of both globes are directed toward the side of the lesion.

(*c*) The *motor phenomena* consist of a paresis affecting chiefly the limbs of the same side as the lesion. There is also increased muscular rigidity on the same side as lesion.

(*d*) There is *inco-ordination*, such that there is rotation and reeling toward the opposite side from the lesion.

(*e*) The *sensory phenomena* include blunting of sensibility, chiefly of the limbs on the same side as lesion.

(*f*) The *reflexes* are markedly increased, chiefly on the same side as the lesion.

There has been much confusion and many differences among experimenters and clinicians with regard to symptoms. Much of the confusion in regard to the reeling may be due to the fact that observers do not adopt the same rule in describing a reeling to the right or to the left, whether it applies to the observer or the observed. Both experimenters

and clinicians are agreed as to the marvelous rapidity with which compensation takes place after disturbance of the functions of the cerebellum. This accounts for the destruction of large portions of this organ by the slow development of tumors without producing symptoms, for, inasmuch as the growth is slow, compensation takes place *pari passu* with the development of the tumor, but in cases of hemorrhage or of rapidly developing abscesses, the cerebellar symptoms are more pronounced, and the earlier the observations the more clearly will the symptoms present themselves. I have been able to verify on the human subject, in three different instances, while performing operations on the cerebellum, the effect upon the eye of irritation of the cerebellum. In each of these cases, I had occasion to explore the latter lobe of the cerebellum and in each instance I asked a colleague to watch the effect upon the eyes while exploring the structure of the cerebellum. In each of the cases, the opposite eye was immediately deviated outward and resumed its normal position as soon as the irritation ended. In none of the cases was there any effect noted upon the eye after the actual irritation, caused by the exploration, had been ended. From both experimental and clinical experience, I regard the cerebellum as being a safe field for exploration and would not hesitate to extend the operation to any portion of this organ. The cerebellum was formerly supposed to exert an important trophic influence, but this is now known to be untrue. The cerebellum was formerly believed to act as a whole, but it is now known that division of the cerebellum mesially does not interfere with the functions of either half of this organ. While the cerebellum has a crossed action on the brain, it has a direct action on the spinal cord.

On the technique of opening the skull. I have tried the trephine and the chisel, each in a considerable number of cases, and have finally given almost unqualified preference to the chisel. Neither the circulation nor the respiration was appreciably affected while opening the skull with a chisel and mallet. The observations were made by recording the results on smoked drums. With the use of the mallet and chisel there is a very great range of adaptability which can not come with the trephine. I use a very sharp chisel, which cuts the bone

with the lightest taps of the mallet, cuts it sharply and accurately, enabling the operator to enter the skull in much less time than by the trephine, enabling him to control the size and shape of the opening. The opening of the skull may be without injury to the brain, either from jarring or from the chisel itself.

After the opening has been made, I prefer the use of a sharp bone forceps to any instrument of special design that I have yet used for the further removal of the skull. The prismatic-shaped, pointed forceps, devised by Mr. Horsley, answers the purpose admirably. The hemorrhage coming from the diploë, while never dangerous on account of its quantity, obscures so much the field of operation that it is important to obviate it. This is easily and readily done by the use of 10 per cent. solution of olive oil and beeswax, making a wax of sufficient consistence to press into the cut edges of the bone, instantly stopping local hemorrhage. This wax is harmless, and may be allowed to remain. I wish, in conclusion, to report a rather remarkable case of the destruction of the so-called "name center" by a bullet wound. I will allude to it only briefly here, as it will be later reported in detail. The case is one in which a 22-calibre bullet took effect just above Reid's base line, on a vertical plane with the anterior border of the ear. The force of the bullet was so far spent in traversing the bone that it was arrested at a depth of seven-eighths of an inch in the substance of the brain in the third inferior temporosphenoidal convolution, cutting a circular hole a little less than three-quarters of an inch in diameter and seven-eighths of an inch in depth, the lower margin resting on the base of the skull, the posterior border of the circular wound being in a vertical line with the anterior border of the external auditory meatus. The bone was cut away some distance around point of entrance and lodgment of the bullet. The bullet was readily removed. No other portion of the brain was injured, neither was there any hemorrhage of consequence. The operation was performed on the eighth day after the injury. The only symptoms manifested were his inability to name common objects. His conception and perception were perfect. Articulation was perfect, and no other function was either modified

or destroyed, excepting his ability to speak common names. This case has been thoroughly worked up from every standpoint, and is very definite in pointing out the location of this center.

The clinical observation upon which this paper is based consists of forty-seven operations on the brain and of a large series of experiments on animals, a part of which have been published, and the greater part to be published in a later paper, the purpose of this paper being to call attention to the value of placing the experimental and clinical evidence side by side, each reinforcing the other.

DISCUSSION.

DR. WILLIAM OLDRIGHT, of Toronto, Canada.—There are one or two remarks I desire to make in connection with this very important subject and interesting paper. A case I have in mind shows that we can sometimes learn by our mistakes. The patient was a man who had been thrown downstairs; he was brought to the Military Hospital with concussion of the brain. I was merely an onlooker. The surgeon in whose charge the patient was, found a spot where the symptoms pointed to a greater amount of paralysis on the left side of the arm, and subsequently found a corresponding spot on the right side. On removing a small button of bone, there was bulging, and he opened the dura expecting to find a clot there. Not finding it, further search was made and it was found on the opposite side, and when he reached the dura and was about to close the wound, not finding any bulging at that point, I suggested that he open the dura, and another physician standing by said what was the use of opening the dura when there was no bulging? He said that a clot would not be found on the brain. The wound was therefore closed without opening the dura. The patient subsequently died, and at the *post-mortem* examination a clot was found beneath the area at which the second opening was made.

With reference to the choice of instruments between the trephine and chisel, there should be no antagonism between the use of the two. There are circumstances and cases where one is justified in using a trephine and following it up with mallet and chisel. In other instances it will be found easier and more useful to use the mallet and chisel alone. In a case of necrosis of the skull (syphilitic) it is manifestly improper to use the trephine, and in such a case the Hammond chisel answers well.

Before taking my seat, I desire to say that Horsley uses a combination saw and forceps, and when he wants to remove a large area he makes a trephine opening first, then diagonally four saw cuts, unites the saw cuts again, and with the point of forceps takes out the whole of this at once.

DR. ALLEN DE VILBISS, of Toledo, Ohio.—I have listened with a good deal of interest to Dr. Crile's paper, particularly as bearing upon the compressibility and elasticity of the brain substance, and I agree with him. But when he comes to the technique of making openings through the cranial bones for the removal of a tumor, or the opening of an abscess, where it is necessary to remove a considerable portion of bone, for instance, in the examination of the motor areas over the fissure of Rolando, where we wish to make a Horsley trap-door brain operation, I believe the consensus of opinion to-day is that where we can make these operations, explore the brain, remove a tumor or open an abscess and leave the skull intact, this is the better plan of doing it. This has been done successfully with the chisel and mallet. It has been done successfully with the saw, as well as with other instruments. It has been done with the little wire saw invented by Keen, a most admirable instrument for cutting off a femur, but I do not think it is quite so handy as some other instruments for making a trap-door brain operation. Of course, we are all more or less wedded to our own devices; but it has seemed to me that an instrument which is safe in the hands of an amateur is more safe in skilled hands. I have opened since 1889 more than one hundred living heads. I formerly opened them with chisel and mallet. I do not know, but probably there are some physicians present who have seen me do it with my chain saw. The danger of the saw was in wounding the dura. I do not like to use it on that account. Then, too, it was a very complex instrument. The surgeon had to be familiar with its various parts in order to meet any emergency that might arise. On account of these things I have devised a bone forceps, and I am sorry that I have not one with me to show you. Many of the gentlemen are familiar with it. (Here Dr. De Vilbiss described the manner in which he uses his bone forceps.)

DR. ALBERT E. STERNE, of Indianapolis, Ind.—I am extremely interested in this subject because it comes within the scope of my own work, and I desire to say a few words on it. The points brought out by Dr. Crile in regard to the cortical centers which have to do with respiration, and those he made as to injury to the brain, and that respiratory failure

is more to be feared than cardiac failure, are well taken. It is commonly believed the opposite is the truth. While I do not give my concurrence to the full belief in the absolute location of the respiratory centers in man, as they have been demonstrated in animals, there is much in experimental laboratory work which proves this. Clinical experience also tends in that direction. We must remember that the cortical centers in man are of greater and higher significance than in animals, and that injuries to animals of far greater severity are sustained that can not be borne in man; this has been demonstrated without fatal results. Cases have been reported in the surgical history of the War of the Rebellion in which severe injury of the brain has occurred, and men have gone through considerable muscular effort before showing the effects of such injury. The celebrated case in Indiana, known to most of you, was that of the Hinshaw murder, in which the wife was shot through the head, after which she walked and talked, and the experts, of which I was one, had much to say in regard to the cerebral localization theory, and whether the injury was compatible with her ability to walk.

Just a word or two with reference to the instruments used in operations upon the brain. I agree with Dr. Crile that the De Vilbiss forceps is an excellent one, but I have one objection to it, and that is, it does slip out. If you use both flanges it will come out of the opening. Nevertheless, it is a good instrument. I like to combine with it the hammer and chisel when I have occasion to do an operation of this kind.

Dr. Frank C. Bunts, of Cleveland, Ohio.—I wish to say that I differ a little from some of the gentlemen in regard to the technique of opening the skull. My own preference has been to use the trephine. The chisel is a valuable adjunct. I quite agree with Dr. De Vilbiss that we are apt to be wedded to our own special methods and instruments, but I wish to say that both Dr. Crile and myself have used the De Vilbiss forceps, and possibly if we had tried it longer we would still have it in our possession; but we have given it away. The trouble that I find in the use of the instrument is very similar to that which Dr. Sterne has mentioned. The little projection which comes from beneath the forceps is constantly slipping out; as we go along we force it under, and the little projection slips out; it gets jammed with soft skull tissue, and becomes so annoying that we have been obliged to abandon its use. In the hands of one who has used it extensively and has become accustomed to it, this little annoyance might be overlooked.

DR. CRILE (closing the discussion).—Dr. Bunts has practically replied to the remarks of Dr. De Vilbiss, inasmuch as he has had the same experience with the instrument that I have. It is an ingenious device in the hands of Dr. De Vilbiss, as well as in the hands of a great many other surgeons. Dr. Bunts uses the trephine with greater skill than he does this forceps. I think every one has his own particular instrument which he likes to use better than any other.

XXXVI. THE ASSOCIATION OF HYSTERIA WITH ORGANIC DISEASE OF THE NERVOUS SYSTEM.

BY PHILIP ZENNER, A. M., M. D.,
CINCINNATI, OHIO.

The diagnosis of disease is the most difficult, and at the same time the most important, function of the physician. This is nowhere more apparent than in hysteria, a disease which may simulate almost any other, and where mistaken diagnosis may not only bring opprobrium upon the physician, but also do much mental and bodily harm to the patient.

The object of this paper is to call attention to the association of hysteria with organic disease of the nervous system, a not very rare occurrence, which enhances the difficulties of diagnosis, not the less so that the fact of such association is too frequently not borne in mind by the practitioner.

We view hysteria now from a standpoint differing from that of former periods. The name is no longer a term of reproach. Hysteria is looked upon as a disease, not a disgrace. Nor is it diagnosed nearly so frequently as formerly, when the case was likely to be pronounced hysteria because it was not known what else to term it. To-day the diagnosis of hysteria is based upon the presence of well recognized symptoms. A large part of what was termed hysteria has been found to be organic or other well recognized disease. The larger part is neurasthenia, a disease whose basis is nerve exhaustion. Hysteria, too, has as its basis, at least in

many instances, nerve exhaustion, but the most important factor is the mental element. It is in large part a mental disease, its manifestations the direct result of suggestion or autosuggestion.

A most interesting question in this relation is that of simulation of disease. There is no doubt that the word of the hysteric is not always reliable, and some conditions—for instance, alleged blindness of one eye, when it can be proven that the patient really sees with that eye—seem very perplexing. Yet it is generally conceded, to-day, that there is little conscious simulation in hysteria.

Let us dwell for a moment on the causes of hysteria, for it will help us to understand why it may occur with organic disease. The most important factor in etiology is heredity, though hysteria does occur without a neurotic history, and apparently, even without the patient's having formerly acquired a neurotic disposition. Among the not infrequent causes may be mentioned alcohol, syphilis, fevers and other debilitating conditions, trauma, shock, and the depressing emotions. It is well to note that the same causes frequently produce organic disease of the nervous system. At the same time organic disease of the nervous system itself not infrequently causes hysteria. There are two factors that are especially effective here—fright or other painful emotional state that the actual disease evokes, and suggestion, the mental effect of present and anticipated symptoms. Let us add an instance of each.

Quite recently a young man came to me with locomotor ataxia. Only a few weeks before he had had the first intimamation that he was not in perfect health, in the occurrence of a sudden diplopia. He learned from his physician that he was afflicted with a grave disease. The fright from this announcement brought on a marked hysterical mental state. It required strong assurances on my part that his condition was not as bad as he feared, and finally a modified rest treatment to entirely remove the hysterical manifestations.

Another case of locomotor ataxia, a man in middle life, who had had pronounced symptoms of that disease a number of years, was seized with attacks of astasia-abasia—inability to stand or walk for a few minutes. He continued to

have such attacks for several months. They finally disappeared under the use of electricity, whose only influence, as applied in his case, could have been a suggestive one. The manner of the attacks and their cure, as well as the subsequent history, indicated that they must have been of an hysterical character.

Apart from the fact of a sometimes common etiology, and therefore coincidence of hysteria and organic disease of the nervous system, the latter may appear in old hysteria, for hysteria is no security against such a development. In such instances the physician is often caught napping, for not only are the hysterical manifestations likely to mask those of a graver disease, but the practitioner is usually not on the alert for the appearance of the latter. I will add a few illustrative cases.

A lady, fifty-three years of age, had hysterical manifestations for many years, during which time I saw her in consultation at varying intervals. At one time she believed herself paralyzed. At another time she had not written for months, and believed it was impossible that she could write until I gave her a firm order, when she did so in my presence, and seemed rejoiced to have that power. At another time she had the same apparent inability to read. She also had aphasic manifestations at different periods.

I have mentioned only a few of the many hysterical symptoms presented in the course of years. Apparently the hysterical disease had been the result of fright and suggestion. Before the hysterical symptoms appeared she had some vertigo and headache, which her physician told her was due to a brain tumor, and that she had not long to live. Though future developments proved the incorrectness of this diagnosis, the idea was never altogether removed from her mind, and she was never again in a contented, easy state of mind, her normal condition.

This patient died of acute cerebral softening. The whole duration of her fatal malady was about six weeks. The symptoms were a very slow and steadily progressing paralysis, first in the arm, then in the leg, but never affecting the face; gradually increasing mental obtundity until toward the end there was profound coma, and the last few days of

life a high temperature. There were several areas of softening, the chief one affecting the upper two-thirds of the central convolutions of one hemisphere. At the very inception of the fatal malady the patient had a pain in the arm, and declared that the arm was paralyzed, notwithstanding that the strength of the arm at this time, and for several days thereafter, seemed to be normal. She was at this time also in a very hysterical frame of mind, laughing, crying, etc. The diagnosis of her physician and of myself in the beginning was hysterical paralysis, a diagnosis that seemed well founded on account of the past history, the hysterical mental state, and the fact that a fixed idea of being paralyzed preceded the actual paralysis, as well as that the paralysis itself presented features to some extent characteristic of hysterical hemiplegia, gradual onset of the paralysis, and its absence in the face.

The correct diagnosis was finally forced upon us by the portentous progress of the case, but, notwithstanding that all the symptoms seemed to point so clearly to hysterical hemiplegia, there is no doubt that we would have made a correct diagnosis at an earlier period if the trend of our thoughts had not been influenced by the long anterior history of hysteria.

Quite recently I saw a patient where a similar history led a large number of physicians astray. She had had hysterical symptoms of various kinds for many years, but her condition had been decidedly worse six or eight months before I saw her, though no other diagnosis had been made. She came to me from a long distance, and, as is my routine custom, a thorough examination was made and Bright's disease detected. The patient died some months later. During that time there was such a commingling of hysterical symptoms and those of uremia that it was often very difficult to determine the character of the manifestations presented.

The diagnosis in such instances may become a very perplexing problem. It is often sufficiently so in hysteria, which may simulate nearly every disease. As an instance I may state that I have seen meningitis taken for hysteria, and hysteria taken for meningitis, and that, too, by good men. Nor is the diagnosis any easier that the hysterical symptoms are likely to be manifested in a part where there is already

actual disease—in a joint that has been injured or where there is a slight inflammation, in a larynx where there is a mild catarrh, and the like.

In the diagnosis we will be assisted by noting, firstly, the personality of the patient, age, sex, heredity, disposition, and history; secondly, the relation of symptoms to emotional conditions, for hysteria, or at least some of its manifestations, may appear at once from fright or other strong emotion, and subsequent symptoms may be influenced by like conditions; and thirdly, the clinical picture presented. The most characteristic clinical features of hysteria are the hysterical temperament (in the lighter cases the chief condition presented), the stigmata of the disease (anesthesia, paralyses, contractures, limitation of the visual fields, hysterogenic zones, etc.) and the crises, which vary all the way from severe hystero-epileptic attacks to mere emotional storms. The diagnosis is sometimes helped by the peculiar grouping of symptoms, paralyses, etc., such as it would appear organic disease could not produce, or by rapid fluctuations in symptoms, their sudden appearance and disappearance, etc. Finally, the marked influence of mental impressions, the power of suggestion over the manifestations of hysteria, may throw a bright light on the nature of the disease.

There are some special symptoms that have a great diagnostic import—for instance, the *globus*, and concentric contraction of the fields of vision, for hysteria; and hemianopsia, alteration of the deep reflexes, rigid pupils, and the reaction of degeneration for organic nervous disease. Yet even these symptoms are not altogether pathognomonic, the first mentioned not at all, and hemianopsia, ankle clonus and rigid pupils have been found in hysteria.

The various diagnostic tests mentioned are not always found, nor are any of them invariably reliable. No wonder, therefore, that the most experienced and skillful diagnosticians have been led into error. The greatest safety lies in always bearing in mind that diagnosis is often difficult, that hysteria and organic disease may be present at the same time, and in a painstaking examination and careful observation of the case.

The importance of correct diagnosis is often very great.

We would avoid the opprobrium of calling organic disease hysteria. On the other hand, we should not doom a case of hysteria by pronouncing it to be organic disease, a doom not only in name, but whose utterance may do untold harm to the patient. It is sometimes equally important that we should recognize the presence of each malady when both are present, especially because of the amenability of the functional disease to treatment. Not rarely, so far as the immediate condition of the patient is concerned, the functional trouble is the more important, and we have already seen that its appearance with organic disease is largely due to mental impressions, fright and suggestion. Hence the power of the physician in combating it by allaying fears, guarding against the ill effects of autosuggestion incident to the organic disease, and inspiring the patient with new hope and courage. Here, as everywhere in the treatment of hysteria, awakening hope and cheer, and suggestive therapy, are the most powerful curative measures.

XXXVII. THE PATHOGENESIS OF FUNCTIONAL NERVOUS DISEASES AND THEIR PROPHYLACTIC INDICATION.

BY JOHN PUNTON, M. D.,
KANSAS CITY, MO.

In scientific research the closing days of the nineteenth century present a scene of unusual feverish activity, unsurpassed in any period of the world's history. The demands of the present age are so peculiar and exacting that each branch of science endeavors to outstrip the other in enterprise and novelty. In the chase for something new and novel to create a sensation or attract attention, the votaries of medicine form no exception, and many a well established scientific medical fact is ruthlessly thrust aside to give place to some new fad or novel experiment.

It is clear to all that much of the work now being done under the guise of medical science is largely in the direction

of selfish personal interest and chiefly pertains to the commercial rather than the truly scientific aspect of medicine. Without any desire to underestimate the labor and value of many worthy members of our profession in their efforts to furnish us with means and measures to combat disease, it is certain that the burden of their desire would far better subserve the needs of the age, if it were applied to prophylaxis rather than therapeusis. The adage "prevention is greater than cure" is as old as the decalogue, yet there never was a time when its tenets were more seriously disregarded by the profession, as well as the masses, than the present. Proof of this assertion is unnecessary, for every thoughtful physician recognizes it, yet if there be one truth more than another that is clearly emphasized by the more recent advances in medical knowledge it is the great need of a general practical application of this ancient medical axiom. Honesty compels us to admit that the science of prophylaxis has not kept pace with the needs and demands of the age, and that there is a great lack of interest as well as marked indifference on the part of our profession in promulgating and enforcing its principles. The consequences entailed by such neglect furnish a fruitful source of supply for our theme and afford abundant material for the pathogenesis of nervous affections.

As physicians we recognize that certain causes produce certain effects, and observe on every hand unmistakable evidence of the baleful influence exerted by certain factors, which, when allowed full sway, become of necessity potent noxious agents in the pathogeny of neurotic disorders. Too many physicians conceive that the full function of their mission is simply to minister to disease, while the great and overwhelming importance of its prevention is by them entirely ignored. It is the purpose of this paper, therefore, to call attention to some of the more common elements which experience proves play the most prominent part in the pathogenesis of nervous affections, the pernicious influences of which, to some degree at least, come within the province of the family physician to correct, modify, and even overcome, but which so far have failed to receive the due attention they richly deserve.

All authorities agree that heredity plays the chief rôle in the pathogeny of nervous diseases, consequently its study becomes of the highest importance. As physicians we do not presume to explain all the intricate details concerned in the genesis belonging to heredity, as the laws which govern the transmission of hereditary traits and characteristics are, generally speaking, unknown. But the number and diversity of inheritable deviations of structure and function are endless, and these are recognized and read by all men, especially those with which we as medical men have largely to deal. Such stigmata of inheritance are often the result of imperfect growth, defective nutrition, incorrect habits, injudicious education, and modes of life of the parents, the general effects of which tend to produce histologic changes in the blood which morbidly react upon the general development of the nervous system in both the parent and offspring. The morbid products resulting from such blood deterioration are readily transmissible from parent to child, and furnish the germs, or seeds, if you please, which establish the neurotic diathesis or nervous constitution. Experience proves that these inherited pathogenic neurotic elements may or may not remain latent for years, but usually when subject to the evolutionary changes incident to the physiologic crises, or the stimulating processes of educational, business, social, or professional life, they rapidly mature and strengthen until they manifest themselves in some form of serious nervous disease. The same causes that produce such deterioration in the parent are often allowed to have full sway in the child, already predisposed, and then a still greater neurotic change is liable to occur.

That a certain predisposition or tendency to nervous disease is transmitted from parent to child, all are agreed and in its incipient essence constitutes that which we term the neurotic diathesis or nervous constitution. This manifests itself by nervous instability and defective enervation of the organic functions, materially influencing the normal development of the nervous system of the offspring, and makes itself felt by a constant tendency to degenerative changes in the nerve elements, rendering the subjects of it peculiarly liable to break down under stress of circumstances that would

not affect another person inheriting a different constitution.

As before remarked these abnormal conditions of inheritance are largely the result of injudicious and unphysiologic modes of life of the parents, which in their essence produce a lesion of nutrition by contaminating the blood, which again produces metabolic changes in its constituents that materially influence and lessen its vitalizing power of the nerve centers. What these special blood changes are, histologic, chemic, electric, toxic, or otherwise, may at present be difficult to satisfactorily explain, but we all understand their effects on the somatic organism and enough evidence can be produced to warrant the assumption that they underlie and form the basis of the neurotic diathesis.

This then becomes one of the mightiest factors in the pathogenesis of nervous affections, and experience warrants the assertion that it is purely a "physical defect," a lesion of nutrition, which can be "remedied" and even "cured," and loses half its horror when this is fully realized and understood. This morbid inheritance that underlies the so-called nervous constitution is not therefore a necessarily fatal heirloom (as erroneously supposed), certain at some time or other to overwhelm its victim, but is subject, like all other impoverished blood states, to the laws and principles which govern the science of prophylaxis and therapeusis, and the importance of this fact can not well afford to be slighted by the family physician in his dealing with children born of neurotic parentage. The idea that the blood is responsible for much of the prevailing nervous disease is not a new one, nor should it be treated as such, for it has been hinted at all through the ages, but the forcefulness of its practical application by the family physician in its prophylactic aspect was never so apparent as at the present time. This in large measure is due to improved methods of histologic investigation and consequent enlargement of knowledge concerning the blood and its constituents. That the integrity of the nervous system depends largely upon its proper blood supply is a physiologic axiom and any interference with this normal correlation becomes at once a pathogenic factor. When we remember the marvellous blood supply of the nervous system and how

dependent the nerve elements are upon this for their physiologic sustenance, we can readily understand the wonderful influence and power the blood exerts in sustaining the integrity of their functional activity. Moreover we are all prepared to admit how easily the blood absorbs and assimilates all kinds of toxic agents and the peculiar affinity that certain poisons possess when brought in contact with the delicate nerve tissues, consequently the character of the nutriment supplied to the nervous centers necessarily affects their power and influence on the somatic organism.

All authorities agree that the common neuroses are largely the result of a morbid inheritance, that the actual nervous disease that the physician is consulted for is engrafted upon a predisposing neurotic basis, and that this diathesis furnishes the most favorable soil for their growth and development. Hence the pathogeny of a large majority of functional neurotic affections are in a sense congenital in origin, while a comparatively lesser number are acquired. We are all prepared to admit that neurasthenia and hysteria constitute two of the commonest and most widespread of all the functional neuroses, and recent experiments in the pathologic laboratory go to prove that in both these disorders there is a rapid disintegration of the red blood corpuscles, resulting in the production of an abnormally large amount of the blood platelets. (St. Louis *Courier*, August, 1899.) This causes toxic changes in the blood, which have a very baleful influence on the functions of the nervous system.

Indeed it matters but little what functional neurosis we analyze, the result in large measure is the same. For instance in studying the pathogeny of epilepsy, hysteria, chorea, neurasthenia, neuralgia, and other allied affections, we are all compelled to recognize the inherited predisposing tendency that led to their development, and when these pathogenic factors are still further microscopically scrutinized the histologic elements of the blood are often found to be the offending agent. In thus recognizing the blood as the noxious agent in the pathogeny of the various neuroses it can not be denied that environment, education, occupation, habits, marriage, physiologic crises and general careers in life are powerful adjuvants in favoring and promoting pathologic

changes in the blood which not only exaggerate the pernicious effects of the morbid inheritance, but react upon the nervous system in such a manner as to produce actual nervous disease. But all such agents are usually secondary to the primary cause, for it must be confessed that even in the acquired neuroses, much less the congenital, such factors spend their force first upon the blood and its circulating medium, which again reacts upon the nervous constitution of the individual.

That the blood is the chief pathogenic factor in the production of the various functional neuroses is something more than theory, and can be firmly supported by a four-fold proof:

1st. By analysis of the family history.

2d. By actual demonstration in the histologic laboratory.

3d. By clinical observation and experience.

4th. By actual results in their treatment.

All authorities agree that the vast majority of the functional neuroses are engrafted upon a neurotic constitution which may be congenital or acquired, and it is known that it can be produced by changes in the blood incident to the causes already referred to. Recent experiments with human blood in the pathologic laboratory go to prove that in certain forms of nervous disease the erythrocytes of the blood disintegrate, while the platelets undergo an abnormal multiplication, resulting in pathologic changes that can easily be demonstrated, and that these morbid products circulating in the blood have a very pernicious influence on the nerve elements favoring the production of neurotic disorders. Those of us who are brought daily in contact with the various forms of nervous disease cannot fail to be impressed with the large number of neurotics who present undoubted clinical evidence of malnutrition and impoverished blood states, which in itself suggests at least the blood as the chief pathogenic factor. Moreover, when the nutrition of such patients undergoes improvement by scientific methods of therapeutics and dieting, the nervous phenomena invariably give evidence of partial if not complete restoration. Even in those cases where the clinical evidence is not so apparent, remedies that nourish the nerve elements and sustain their functional integrity are usually rewarded by changes for the better.

If, therefore, it can be demonstrated by reference to a large number of family histories that the great majority of the neuroses are based upon an inherited or acquired predisposition or neurotic constitution, and that this again is recognized in the laboratory as a lesion of nutrition or change in the constituents of the blood, which receives further support clinically by the large number of neurotics suffering from malnutrition, and that when these conditions are remedied the nervous phenomena improve and often disappear, it would suggest at least the validity of the argument set forth that the blood is largely the responsible pathogenic factor in the production of the various functional neuroses.

If these premises be tenable, and certainly the trend of modern scientific research favors their validity, then it no longer remains a theory but becomes an absolute scientific fact, and as such deserves the recognition it richly deserves. Moreover, if it be conceded that the functional neuroses are in their incipiency largely based upon a congenital or acquired neurotic soil that amounts to a lesion of nutrition, which again is subject to pathologic exaggeration by the powerful influences of heredity, environment, education, occupation, habits, marriage, physiologic crises, and general careers in life, then it would seem that their appropriate prophylactic and therapeutic indications are clearly defined. Family physicians who have the professional guardianship of persons, more especially children, known to inherit or possess this neurotic vulnerability should fully recognize the dangers accruing from its neglect, and prescribe for them the inexorable laws of prophylaxis, and therapeutic measures that tend to nourish and sustain the integrity of the nervous system. Pure blood should be the lofty ambition of every individual, and one way to secure this is by wisely regulating marriage, and the adoption of all civil and legal measures that favor its production. Indeed, the time is near at hand when the diagnosis of the more obscure neuroses will be confirmed by the scientific microscopical examination of the blood. The medical aspect of sociology as embodied in the clinical study of heredity, environment, education, criminology, intemperance, marriage, and the special relation these bear to the pathogenesis of nervous affections, should certainly claim our

most earnest attention. In poverty-stricken districts, where the parents are too poor to provide the necessary means to guard against the inevitable results of transmitted taints, or other injurious influences referred to, it is our business as physicians to appeal to the state legislature to make the necessary provision for their proper care and protection.

That we, as a profession, are not sufficiently engrossed with the all important problems of prevention as presented by our present sociologic studies is clear to all, for in the light of facts how can we sanction by our woeful indifference the continued abuse of certain influences which by their very nature tend to generate or develop a serious chronic neurotic invalidism that is well-nigh incurable. The duty of every physician who deals with his profession as a noble and humane science is to point out the methods of preventing the occurrence of actual disease in latent constitutional defects, or other individual vulnerable weakness, rather than confine his sole attention to the treatment of their more active manifestations. The responsibility of the medical profession in relation to the coming manhood and womanhood of our race is too lightly regarded, and not until we, as a unit, arise from our indifference and deal positively with the medical sociologic problems that confront us, in a more practical manner, can we ever hope to stem the ever increasing tide of neurotic disease, and thus fulfill the true function of our mission as guardians and conservators of public health.

DISCUSSION.

Dr. Philip Zenner, Cincinnati, Ohio.—There is no more weighty subject, especially as far as nervous diseases are concerned, than the relation of heredity to disease. This is important principally because something can be done to lessen, or at least try to, the hereditary elements by proper precautions. Dr. Punton did well to call attention to the fact that when the element of heredity does exist, much may be done to lessen it. The family physician should always bear this in mind, and instruct the parent from the time of birth how to take care of the child. The child which is deficient mentally must be brought up in a more wholesome manner, and with greater care, than a normal child. I believe the essayist has taken too optimistic views as to finding

pathological changes in the blood which would explain the occurrence of symptoms of nervous disease. Nevertheless we do know that building up the patient's system does a great deal toward removing the symptoms of disease, but I would like to impress the fact that treatment of the mind itself is even more important. We should try to instill new power and mental vigor, especially in those patients who have hysterical tendencies, as much can be done in that direction.

Dr. Daniel R. Brower, Chicago, Ill.—In my capacity of a consultant, I very frequently have general practitioners bring a case to me in order to ask my advice, and it is but rarely that the doctor possesses any knowledge whatever of the condition of the blood. The methods used in blood examinations are at the present time so exceedingly simple, and so easily carried out by the average practitioner, that I am free to say that there is little excuse for their want of knowledge of this most important part of the human organism. The hemometer and the hematocrit can be very quickly applied, and require but a moment to demonstrate the results, and the present methods of blood staining can be used with so little loss of time that it seems to me the general practitioner should give more attention to the blood.

I make it a routine practice to examine the blood of every case which comes under my consideration, as I regard it to be equally as important as the examination of the urine. No practitioner of to-day would permit a case of any gravity whatever to pass through his hands without knowing the exact condition of the urine. Equal attention should be paid to the condition of the blood, especially so as the means of making examinations are so very simple. As Dr. Punton has stated, the early recognition of the impoverished state of the blood, and the immediate resort to the proper means of bringing about a normal condition, should do much towards the prophylactic treatment of diseases of the nervous system.

We have not sufficiently recognized the condition of the blood as an etiological factor in the causation of diseases of the nervous system, and therefore Dr. Punton's paper is an especially valuable one, and deserving of the very highest appreciation.

Dr. J. A. Witherspoon, Nashville, Tenn.—The doctor's paper has brought out one very important fact. In the first place, while the view of the hereditary transmission of disease through the blood is not a new one, it has not been empha-

sized enough to make the proper impression on our minds. There is no doubt but that the next few years will clearly demonstrate the truth of Dr. Punton's statement, but there is one fact to which I especially wish to call your attention, and that is, what can the general practitioner do to prevent the conditions and storms of life, which precipitate nervous disease on top of an hereditary tendency? Children born of neurotic parents, inheriting the diseases of these parents, should be especially watched over and trained by the family physician, so as to prevent, if possible, the development of trouble later in life. One of the most trying periods in this child's life will be the eruption of its teeth. That child, with neurotic tendencies, if not properly guided during this period, will become a prey to faulty digestion, and will add to that existing tendency, making its nervous system more susceptible to and have less resistance to the oncoming storm.

The next most important stage is that of puberty, when there is a hyper-sensitive condition of the nervous system. The body at this time is taking on different functions and undergoing changes.

These functional nervous diseases are seen much more frequently in girls, as they are largely precipitated by the education of our girls. The crowding of their minds at the expense of their developing nerve force, the taking away of the blood from the generative organs and other systems, the faulty hygienic surroundings in many of our colleges, are responsible for many functional nervous diseases. If a child has natural hereditary tendencies to nervous diseases, these conditions help to precipitate them. The next most important thing we see through life is in those especially susceptible people who are a "bundle of nerves." Childbirth, prolonged lactation, wasting diseases and depressing influences, all have a bearing upon the nervous symptoms of these patients. It is at these times that we should act in our capacity of guardians of the family.

While I do not for one moment mean to imply that these conditions produce the nervous trouble, I wish to emphatically state that they impoverish the blood, making impossible the proper performance of the functions of the various organs of the body. The proper care of our patients during these various crises of which I have spoken is absolutely essential. If these patients are born with suitable soil and pabulum for the proper growth and development of the germ, quiet them until body resistance has been established, when the danger of the development of any functional nervous diseases will be very much lessened. The same applies to patients who have in the course of their life acquired these neurotic influences.

DR. WILLIAM F. BARCLAY, Pittsburg, Pa.—Some years ago, I became very much interested in this subject, and studied Nordau's "Degeneration," and Lombroso's "Female Offender," and I believe that the study of these subjects tends to create optimistic views. I visited the prison and learned the history of the inmates. Warden Wright, who has control of the Western Pennsylvania Penitentiary, informed me that statistics show that 95 per cent. of all criminals in that institution, returned either to that or some other penal institution. It would almost force upon us the conclusion, "once a criminal, always a criminal."

DR. ALBERT E. STERNE, of Indianapolis, Ind.—I wish to emphasize some of the remarks made by Drs. Punton and Zenner, in whose papers I was very much interested. One point especially in Dr. Zenner's paper ought to appeal very strongly to the general practitioner. We are very careless in what we say to patients. It occurs almost daily in my practice that patients come to me exhibiting symptoms of a neurotic condition, who have been told by their attending physician that some serious condition underlies the symptoms shown, and it takes an almost impossible amount of mental force to eradicate that impression and overcome its evil effects.

Honesty is undoubtedly the best policy, but to be too honest is going too far when we deal with our patients. It is necessary to tell patients the exact state of affairs, so far as you must have their intelligent co-operation in carrying out the line of treatment which you prescribe for them. In cases of hereditary diseases patients can often prevent having instances occur which will affect them most seriously, but do not say to them that they are liable to drop dead at almost any minute.

Dr. Zenner is correct in associating hysteria with the organic manifestations, not only of the nervous system, but of any part of the body. Neurologists naturally meet with these conditions more frequently than the general practitioner, but even they make the same mistakes, and ought to be censured more severely than the general practitioner.

I fully agree with all that Dr. Punton has said, and believe that we are not yet far enough ahead, but possibly we will arrive at the correct stage before very long.

DR. JOHN PUNTON (closing the discussion).—I wish to emphasize the fact that any advance in medicine is always met with more or less opposition. It is to be expected. I did not expect that my theory would *not* meet with the custom-

ary opposition. Three years ago I read a paper before a medical society, and some of my ideas were at that time considered to be ridiculous, and they were treated as a joke, but these very ideas have since materialized. One of them was in connection with schools. I predicted that the time was near at hand when our schools would be put under medical inspection, and I was gratified to learn that the Boston Board of Education has adopted this thought. It is now the rule for our schools to be under medical inspection. The time is coming when it will not only pertain to contagious diseases, but also to hereditary taint and characteristics of children.

Another idea which I advanced at that time was that of marriage being regulated by law. It was believed to be sound in theory, but not in practice. It is now being adopted in various states, and in Michigan they went to even a greater extreme than that, as they allow no one to marry who has been known to have had either syphilis or gonorrhea.

I believe the time is coming when some of the more obscure diagnoses will be referred back to the laboratory and confirmed by microscopical examination.

XXXVIII. TEMPERAMENT AND DISEASE, OR "THE NEW HUMORAL PATHOLOGY."

BY ALBERT E. STERNE, M. D.,
INDIANAPOLIS, INDIANA.

Doctrines of physiology and disease, like events of history, sometimes repeat themselves. So it comes to pass that from the evolution of medical thought and fact, the most recent knowledge of physical metabolism takes its origin. To-day we teach of autointoxication, or self-poisoning of the individual—the outcome of sound scientific bacteriological research, and it brings us dangerously near the theories of ancient medical philosophers, who, with keen observation, but slight scientific explanation, taught of a humoral pathology at least as far back as Hippocrates (460–377 B. C.). The modern ideas about the animal alkaloids (ptomains, leucomains, and other organic toxins) and the therapeutic adminis-

tration of the various animal extracts certainly substantiate this view. In many respects, therefore, what I am about to say may be designated as "the newer humoral pathology."

Normal physiologic chemistry is the *art* of living, is health; the abnormal is the *ab-art* of life, its aberration is disease.

The question then arises, simply, what constitutes health, and whence arises disease? Health, the expression of normal animal economy, depends upon three conditions, namely, assimilation, reaction and disassimilation (Lyman). All matter serving as fuel to the organism must be taken up, must be converted from mere inert substance into living particles, (assimilation), carried to the various body-organs and tissues where it exerts its functional purpose (reaction), and thence, with other useless products of the chemical changes, is conveyed to the emunctories, and reappears once more as non-living excreta (disassimilation).

This cycle is nutrition in its broadest sense, is the physiologic chemistry of life. To its fulfillment certain conditions are necessary, comprising the material and spiritual elements of the organism. These two represent the body-constitution and the body-temperament, terms in use for ages, but vaguely understood. Notably is this true as regards temperament.

Philosophic tradition has handed down to us a temperamental classification, in vogue even at the present time, which has a certain justification, viewed exteriorly. In reality, however, it is founded upon a misconception of the term "temperament." The old classical distinction of temperaments formed a quaternion, or group of four, to wit: (1) The choleric, (2) the melancholic, (3) the sanguine and (4) the phlegmatic. These designations have maintained themselves, with slight changes, to our day, though they rest upon more or less groundless theory. It is true that from the study of the vast mass of individuals, some such grouping as the above seems correct, but its sole support is an outward manifestation of temperament, not the underlying force, or train of forces, itself. From time to time other theories of temperament have been advocated (Cabanis, Paulhan, George, Wundt, Lotze), but all of them rest upon the erroneous foundation of external adornment.

Wundt (Physiolog-Psychologie, Vol. ii, p. 345 f. f.) accepts

the four-fold group, but insists that all workings of the mind depend upon two factors, strength and speed. He, therefore, pairs the temperaments into fast and slow, and strong and weak, as follows:

	STRONG.	WEAK.
Quick	Choleric	Sanguine.
Slow	Melancholic	Phlegmatic.

Unfortunately here, too, the essential meaning of temperament is lost sight of.

Lotze (Mikrokosmus, Vol. ii) regards no single designation as aptly pertaining to ordinary individuals, but believes each and every one of the quaternion may be manifested by the same person at diverse times. To him childhood represented the sanguine with its precocious receptivity; youth shows the sentimental (melancholic), middle life the choleric, and old age the phlegmatic.

Here again we find elements of truth, but the foundation is unstable, and Lotze frankly admits that the doctrine of temperaments is vague and undeveloped.

It seems to me that the reason of this uncertainty lies near at hand. The older writers understood not at all the correct conception of temperament, and many modern medical philosophers, too, had slight knowledge of its meaning. As a matter of fact, very little indeed has been written upon this subject, even standard works on medicine, organic chemistry, physiology and philosophy passing it by without mention. Men who have been epoch-makers in the world of thought and matter, like Darwin, neglected it almost wholly.

It remained for students of organic metabolism to bring a clearer light to bear upon the essence of temperament and, in some measure, to distinguish it from other fundamental elements of health and disease. The modern idea of this term is possibly best conveyed in the words of Bouchard. He defines "temperament" as "the dynamic characteristic of the organism." In other words, it is all that which concerns the individual variations of the nutritive activities. It is, therefore, wholly internal, yet has an external manifestation which can, it seems to me, be best described by the word "disposition." It is this latter term which was formerly meant by temperament, yet the two are by no means identical. Indi-

vidual "disposition" is merely the outer visible mark, through the study of which ofttimes approximate conclusions as to the nature of the fundamental internal processes of nutrition may be gained. Herein I am, I believe, speaking advisedly, for it must have occurred to many of you frequently that you have been able to form nearly definite ideas of individual conditions by the movements, expression, manner and speech of these individuals, conclusions which were possibly substantiated by subsequent physical examination. This statement is noticeably true as regards children's acts and thoughts. Disposition is, then, the visible measure of temperament, of innate nutritive forces.

That every individual seems to possess a certain "natural disposition" is an observation readily made by the study of the daily life in thought and action of those about us. Sometimes, it is true, this natural trend seems to undergo marked changes, even to become totally lost, but close scrutiny usually reveals an innate tendency apparent to the individual in question. The changes merely mark the momentary effect of extrinsic causes acting upon the nutritional forces, the perception of which usually fades from the individual consciousness.

While I am speaking of limits of meaning to certain terms, I desire to define two others often used in this connection, sometimes erroneously, for temperament, with which they may have much to do, but from which they differ markedly.

"Constitution" is a term which conveys to my mind the purely material factor of the organism. It deals wholly with the structure and framework of the body. It represents an individual anatomico-physical condition, whereas temperament is the physiologic-chemical equivalent of the same organism. The constitution is the material expression of resistance offered by the body tissues to the encroachments of disease, or any tendency toward disease.

Any inclination or predisposition to develop an aberration of nutritive functions constitutes a "diathesis." When this tendency shows itself fully developed, we recognize conditions of abnormal nutritional activity, and then we justly speak of disease. No diathesis can be properly termed "disease"

during the developmental stages; yet the existence of a diathesis, if it be but recognized, offers a valuable therapeutic standpoint, in that it becomes possible to prevent disease by leading the diathetic currents into normal channels.

By a proper comprehension of these three phases of the animal economy—"constitution," "temperament" and "diathesis"—it seems to me that the various phenomena of life lose much of the mystery surrounding them. But it is not alone from the philosophic point of view that we should regard them. We have still higher functions to perform as physicians, namely, to strive to maintain such individuals as fall to our care in a state of normal existence. To do so, it is essential that we primarily recognize all the factors I have spoken of. All three are of great practical value, for the proper balancing of "constitution," "temperament" and "diathesis" makes up the diagnosis of every individual case. "Constitution" and "temperament" together form the prognosis and the "diathesis," respectively, its developed state, "disease," offers the only proper therapy.

The subject here under discussion covers a vast field, too vast to even attempt an adequate portrayal. Its beginning properly coincides with the earliest time of infancy, possibly is even antenatal, and its end not reached until the living tissues become inert, dead matter. I shall, therefore, at the present time be forced to limit myself only to certain phases of this doctrine of the temperament, namely to such as I believe we as practical physicians may feel a qualified interest in, leaving to the future the more elaborate development of this subject.

From a practical standpoint, then, it seems well to me that we recognize certain forms of innate temperament and diathesis, taking such only into consideration as I feel there are ample grounds of upholding.

Close observation and much study make it probable that living tissues, like those of inanimate creation, can be regarded chemically as either alkaline, acid or neutral in their properties (Gibier). We may substitute, therefore, in place of the classic group of temperaments, which, as has been mentioned, related only to visible individual disposition, a classification of chemical character, grouping only into three,

though a variety of degree between them may be presented. These three are coincident with natural reactions, and are:

1. The alkaline temperament,
2. The acid temperament,
3. The neutral temperament.

(Gibier.)

Furthermore, it will be borne in mind that all of them refer only to nutritional activity in the sense in which I have already spoken. A short study of each of these three temperaments may serve at this time to explain, in a measure, what the above train of thought has led to, without detailing the intermediate steps in their elaboration, which would lead us into the depths of nursery, developmental and dietetic philosophy.

The alkaline temperament. Individuals of this kind show a decided alkalinity, and such fluids as are usually highly acid, like the gastric fluid and the uterine secretion, are much weaker in their reaction, while those normally alkaline—for example, the blood—are frequently very much increased in this direction. Careful scrutiny will reveal that such persons are almost exempt from certain diseases, and, on the other hand, are peculiarly subject to certain other affections.

They almost never, or but seldom, suffer from arthritic troubles; chronic rheumatism and gout are practically unknown to them. From eczema and psoriasis, from varices and allied conditions, they are almost immune. Cancer, in its various forms, seems not to occur among the alkaline, nor are vascular and cardiac affections frequent. It is especially noteworthy that diseases closely related to each other, as vascular and cardiac to rheumatic and gouty, do not attack these persons. From sourness of the stomach (pyrosis) they are quite free.

On the other hand they readily acquire other maladies, notably when they live in cities and can not afford to eat much meat, for animal food tends to acidify the tissues, and in a measure neutralizes the ill effects of hyperalkalinity. Moderate quantities of spirituous liquors also are a potent means of acidification. The diseases to which the alkaline temperaments are most prone are the tuberculous, notably the pulmonary variety, and to scrofulosis, which is un-

doubtedly also tuberculous in character. A vegetable diet and total abstinence from alcoholics tends to increase alkalinity and is distinctly harmful to those predisposed by environment and heredity (diathesis) to any form of tuberculosis.

The acid temperament forms an almost direct antithesis to the alkaline, and, curiously enough, the diseases to which the former are subject occur only infrequently and in mild form among the latter. The converse is also true. It is thoroughly well established that individuals of this temperament suffer from hyperacidity in all of its forms, and from the maladies associated with this dyscrasia. All the normally acid secretions show highly acid reactions, and the normal alkalinity of the blood and the intestinal juices is markedly reduced.

To all arthritic affections, to gout and to rheumatism, to the herpetic skin eruptions, to vascular degeneration with aneurism formation and apoplexy, and to forms of nerve degeneration associated with, or dependent upon, arterial lesions (paresis, scleroses, tabes, migraine, hysteria) they are particularly liable. Cancer and epithelioma are frequent, notably where acidity exists normally, which now becomes overacid; stomach and uterus are, therefore, especially choice locations. Among women of the acid temperament sterility is often observed (uterine acidity). Possibly the highly acid media of the body offer poor nutrition to a variety of pathogenic microbes, and so lead to the fact that persons of the acid temperament are rarely affected by tuberculosis and seem immune to yellow fever and cholera, as well as other acute intestinal infections.

The neutral temperament. May well be regarded as the normal state, happily inherited from sound ancestry or fostered by wholesome ways of living from birth onward. Persons of this fortunate class, while they may become temporarily acid or alkaline, by reason of alimentation and habits of life, are readily curable from such affections as often become intractable among members of the other temperaments. But it is not alone in sickness that we note this characteristic, for morally and mentally the neutral temperament is readily controlled, while the markedly acid and alkaline are difficult to control. Moral and mental atavisms are ofttimes observed

among the extremes. Objects of degeneracy are rare among the mean.

It would possibly be interesting to enter deeper into the subject of diathesis in this connection, but I can not do so at present. It may be well, however, to mention that but two great tendencies prevail, namely: 1, the *scrofulous*, or predisposition to tubercle development, closely allied to the alkaline temperament, and, 2, the *arthritic*, under which is also included the neoplastic, and which consorts especially with the acid temperament.

The question naturally arises in our minds; have we any corroborative experience in the realms of disease to substantiate the ideas herein advanced? It seems to me we have—abundant evidence. Let us look for a moment into what I feel like terming the "association of diseases." It is certainly more than passing strange, more than mere coincidence, that we so frequently find certain maladies side by side, seemingly independent, though often allied, in one and the same individual. On the other hand, it is remarkable that certain other affections are rarely met with in the same person, seem even antagonistic to each other. We should seek logical causes for our clinical experiences and our pathological knowledge. It is not sufficient to say simply that this or that disease takes this or that course, because a certain individual possesses these or those traits of character. Is it not, at least, quite as likely, and more logical, to assume that the very traits to which we refer are themselves marks of a given fundamental temperament, which favors the development of certain well understood tendencies to disease? *A priori*, it is just as likely, and actually, it is vastly more scientific reasoning.

Is it scientific to reason that because a person happens to be blonde or brunette certain characteristics of thought and action follow? Is it not more reasonable to say that because certain physical conditions obtain such and such an one acts so or so? The type of expression would follow as an effect. It would not be a cause.

And so it is also with association of disease, to which I can not refer here with as much detail as I desire.

Is it not a fact of remarkable import that patients wasted

to the last degree by arthritism (lack of oxidation and loss of nutrition) seldom, if ever, fall victims to any form of tuberculosis, when we could fairly say, general conditions for the development of the latter would be most favorable, were it not for some underlying antagonistic tendency or principle. Experiences of this kind are worth serious thought. Cancer, too, and tuberculosis, I have never seen together; nor does the latter show itself even in the extreme cachexia of the former.

As I have already pointed out, arthritic and cancerous affections are essentially acid affections; tuberculosis develops almost exclusively on alkaline foundations.

On the other hand look at the maladies which frequently associate themselves together. The most classic example is that of arthritis, endocarditis and chorea, of which I have elsewhere spoken. These three affections all arise upon an acid foundation, are even characteristic of the acid temperament.

Migraine—real hemicrania—I have never seen save with the essentially acid. Examples of this kind could be readily multiplied, but I desire to look elsewhere than at the bedside and in the consulting-room.

Many extravagant claims have been made by the believers in a vegetable diet for human beings. They claim it prevents consumption; that the eating of beef or animal food is conducive to its development. Experience with certain animals and man does not substantiate these claims—in fact, speaks clearly against them.

It has been found that about 25 per cent. of the mortality among the birds and animals in Regent Park (London), is due to tuberculosis, a percentage almost double that among human beings taken the world over. Of these animals the meat-eaters are very much less affected. Among the mammals that eat only vegetable food—the monkeys, kangaroos, antelopes and deer—tuberculosis causes about 26 per cent. of all deaths. Among the purely meat-eating beasts, such as lions, wolves, leopards, etc., the loss from this disease is but 3 per cent. Birds eating no meat show a mortality of 30 per cent., while the carnivorous birds—eagles, owls, vultures, and other birds of prey—suffer only to 11 per cent. of the number lost. These contrasts are certainly impressive, not merely coincidental, and surely have great significance.

We can even see corroborative testimony in frequent morbid conditions among our domestic animals. Note the common affliction among our cattle, the horned variety especially, which are herbivorous and alkaline. It is tuberculosis.

Observe how frequently the faithful dog limps painfully about with rheumatic joints, or twitches with chorea, or claws and scratches his skin itchy with eczematous disease. He is carnivorous and acid.

Experiments in the bacteriological laboratory also lend color to these statements. Observation has taught us that certain pathogenic organisms can not grow in or on acid media. Neutralize or alkalinize the acidity and they thrive abundantly. So, too, a little glycerine added to an inert medium allows tubercle bacilli to develop readily. (Roux et Nocard.) It has seemed to me that the suggestions presented are of great practical value — if they possess any value at all. While they may well be applied as a form of treatment in the developed disease or in the earlier diathetic tendencies, their greatest worth must lie in the province of prophylaxis. If it be possible — as it is — to recognize qualities of temperament in the very young, we may be enabled to forestall the manifest inclinations of ancestry or heredity, which notably follow distinct lines of development. Theories and practices which take us into the nursery are, I know, unpopular and likely to be shelved. It is for this reason, possibly, that the results of our best efforts are so often unsatisfactory. Physicians usually fail to reach back far enough; they want good results right away and are not content to await the real outcome of their endeavors in generations beyond the present. Yet it is just here where we make the greatest mistake. We may, and often do, cure maladies in individuals, but thus far we have failed, with few exceptions, in spite of the enormous progress the science of medicine has made in recent years, to subdue the deviations from the normal nutritional powers which constitute morbidity. The study of "temperament" is still in its infancy, has been even scarcely taken up, but it offers, I feel sure, a rich and fruitful domain for practical research, and its results will be shown in the future.

DISCUSSION.

DR. WM. F. BARCLAY, of Pittsburg, Pa.—The paper just read is not only a very suggestive, but also a most practical one, touching a subject which we can hardly sufficiently appreciate. The fact that the conclusions arrived at are accurate is substantiated by personal observation. It was my business for a number of years to study tuberculosis in cattle. The doctor has informed us that cattle are herbivorous, and their temperament an alkaline one. I was called upon to study the cause of the frequent occurrence of tuberculosis in these animals, and after considerable study, I arrived at the conclusion that this disease was to a large extent caused by the drinking water, which was contaminated by the different forms of effete matter. I have no doubt at all but what the doctor's observation as to rheumatism is correct.

I also observed, during my experience as a practitioner for over thirty-three years, that it is exceedingly difficult to induce our tuberculous and scrofulous patients to eat animal food. This fact, as you all know, led to the suggestion and use of cod-liver oil, which is beyond question a most useful adjuvant in treatment. It is even impossible to get this class of patients to eat fish, and in many cases even eggs are distasteful. I have no doubt that carefully recorded observations will demonstrate, as Dr. Sterne has suggested, that there is more in what he has said as to temperament and its influence on disease than is at present realized. It would behoove us to bear this in mind as an etiological factor of disease.

XXXIX. ENZYMES AND IMMUNITY.

BY CHARLES T. M'CLINTOCK, M. D., PH. D.,

DETROIT, MICH.

The problems of immunity are the most fundamental of all the problems in curative medicine. We are forever besieged by innumerable hordes of lower organisms, which will, if they can, destroy us. Soon or late, alive or dead, they triumph and literally destroy this body of ours. During life and fair health we hold them off, or, as we say, are

immune to their attacks. What gives this immunity? On what physical or chemical conditions is it dependent? Why is it present at one age, absent at another? Sufficient for all needs to-day and wholly inadequate another time?

These, I repeat, are the most fundamental, most important of all questions in therapy. Anything like a satisfactory explanation of all the phenomena of immunity is as yet quite impossible. Of this we are sure: instead of being simple or somewhat dependent on some one thing or condition, immunity is a most complex affair. The immunity to small-pox gives not the slightest protection against tuberculosis or cholera. The heel of Achilles is always exposed. Be you ever so strong, there is always some disease germ to which you are susceptible.

In the germ-caused diseases the phenomena are those of a combat, a struggle for existence between two opposing forces. On the one side disease germs, insatiate, at times all but innumerable, eating, devouring, poisoning—a pitiless foe.

Opposed are the body tissues, normally well equipped for defense—barrier walls of dead cells, impenetrable membranes, and marvelous ability to repair breaches, a soldiery instantly available—poison and germ-destroying agents, eliminative organs, nerve food and defensive powers.

As the one or the other of these forces is stronger we have immunity or susceptibility. If the tissues are at the outset susceptible, the bacteria grow—and yet recovery takes place. It means that an immunity has been developed; in some way the tissues have gained a power they lacked at first.

We speak of many of the contagious diseases as being self-limited. In a sense this is not true. The bacteria never quit until forced to. Pasteur supposed that their multiplication was stopped on account of the exhaustion of some necessary food. We know that this is not the correct explanation; they cease only when the body is able to destroy them or their products. And if we are to give any essential aid it must be by assisting to develop this immunity.

What are the agents for attack and defense in this struggle we call disease? For several years the opinion has been gaining ground that they are, frequently at least, enzymes, unorganized ferments. Matter as it occurs in living things

is soluble or insoluble, liquid or more or less solid, according to the needs of the organism. This change in condition is effected, in so far as we know, solely by enzymes. It is probable that every living cell has to some extent this power, to liquefy or to solidify certain kinds of matter.

We are acquainted with a few of the enzymes, while it is probable that there are *many* kinds of them. On account of the nature of their food the lower plants must of necessity be strong enzyme-producers. We do find among them those that readily digest cellulose, as manifested in the decay of wood, horn and hair, the stone-like coverings of many seeds and nuts—digestion that is impossible for us. Most of them can rapidily digest proteids and carbohydrates. For some time I have been studying certain of the bacteria with the view of finding a better proteolytic ferment than pepsin or pancreatin. You will recall that the most powerful diastase we have is obtained from one of the lower forms of fungi.

In growing large quantities of diphtheria germs for the production of toxin, we notice occasionally that there is a vigorous growth of the germs, the surface is covered with a thick scum of them and on the bottom of the flask there is a thick layer, yet in a day or two they wholly disappear. Examining the flask we find that it is contaminated; there is a foreign germ present, and this has produced a ferment which digests and literally eats up the bodies of the diphtheria germs.

Watching the growth of other germs, in particular the germ of green pus, we note that without any contamination the germs disappear—a case of autodigestion, i. e., the germ produces a ferment and in time the ferment digests the germ, just as after death the stomach will digest itself. The failure of the living stomach to digest itself suggests a possible explanation for the difference between pathogenic and non-pathogenic bacteria. Thus the non-pathogenic bacteria produce enzymes which act only on dead protoplasm, whereas the pathogenic product can digest living protoplasm, or, if not, it has the power first to kill, then to digest.

The similarity of many of the phenomena of disease and of disease resistance to enzyme action has been noted by a number of observers. In general, toxins and antitoxins in

their behavior to heat, to precipitation, to dialysis, drying and the like, are much as the enzymes. Note the similarity of the consolidation in pneumonia to the clotting of blood, or to the coagulation of milk by rennin; and the resolution, how like the digestion of proteids.

In a preliminary investigation I find that pepsin, aside from the action of HCl, will kill a number of species of bacteria, but fails on some. I am strongly inclined to believe that the disinfecting power of the stomach is due far more to the ferments present than to the hydrochloric acid. The diastases destroy some bacteria; the neutral ferment, bromelin, some. Loew and Emmerich report that 2 c. c. of a solution of an enzyme obtained from the bacillus of green pus will kill two and a half million virulent anthrax germs in five minutes. According to these authors this enzyme rapidly destroys large numbers of the germ of typhoid, diphtheria, plague, etc.

That one germ or its products can aid or hinder the work of other germs has long been known, and it has been the dream of many workers that we would ultimately fight disease germs with other germs or their products. It appears as if this dream is about to be fulfilled. To this later.

If we inject large numbers of many of the non-pathogenic bacteria into the veins of a healthy animal, after some hours we are unable to find a trace of them, unless it be that they are of the spore-producing kind. Not only have they been killed, they have disappeared; nor are they in hiding, they are gone, dissolved, digested, if you will. Your patient recovers from peritonitis; for the most part the millions of germs present during the disease are not excreted—although some of them are—the germs are dissolved. In the cold abscess the tubercle germs producing it often all but disappear.

We have an animal that has been artificially immunized to cholera or typhoid. We inject some of the actively motile germs into the abdominal cavity; after a few minutes kill the animal, and, examining the peritoneal fluid, we find that the bacteria have ceased to move, they are swollen and distorted, their cell membrane has been altered so that they stick together. If the exposure has been long enough they are

dead. With certain limitations all of the phenomena are produced when a drop or so of the blood-serum is added to cultures in test-tubes. There is a something in the blood and fluids of the animal that quickly affects the germs. These agglutinins, as they have been named, act like enzymes, and are by most observers believed to be such. The Widal test is the most widely known of these phenomena.

Draw a little blood from a calf, then vaccinate the calf. Wait two weeks and again draw some blood. With the blood-serum obtained from the bleedings mix some active vaccine virus. After a bit vaccinate a healthy child on both arms, using one of the samples of vaccine for each arm. It will be found that the vaccine mixed with the serum from the vaccinated calf is inert; that with the serum of the same calf before vaccination is active. Repeat this experiment with blood obtained from horses, hogs, monkeys or men, the result is always the same. The blood of any of these animals before they are vaccinated has no ill effect on vaccine virus, whereas after vaccination it rapidly kills it. The blood of men and animals who have recovered from smallpox contains this antivirulent substance—the power to kill vaccine. All that we know leads us to believe that recovery from smallpox or vaccination is due to the development of this substance.

We vaccinate a child. The vaccine organism, whatever it may be, multiplies rapidly, the phenomena of the disease appear, but after about a week these anti-bodies begin to appear in the blood. Whether they are produced by the body, by the vaccine organism, or by the two together, we can not say, but come they do and in turn kill the vaccine organism, and we say the disease is self-limited. Note the similarity here to what takes place in the flask containing the green pus-germs. The germs grow, produce enzyme, which in turn destroys the germ that produced it. This antivirulent substance found in the blood of the immune to vaccine or smallpox seems to be an enzyme related to the diastases. Compared with the antitoxins it is a very stable body, resisting heat, sunlight, putrefaction, time—to a remarkable degree. It has been demonstrated in the blood of a man who had recovered fifty years before from smallpox.

After looking over the evidence, which is too voluminous

to be more than mentioned here, it appears to me to be fairly well proven that the body does destroy disease germs and organisms with enzymes.

But how about toxins? The germ poison? The evidence is not so conclusive, although there are many facts indicating the probable truth of the enzyme explanation.

Grind together some tetanus toxin and portions of the brain or upper cord of a susceptible animal. The mixture soon loses its toxicity and even becomes slightly antitoxic.

Emmerich and Loew give a number of experiments to show that the green pus enzyme, pyocyanase, as they call it, not only destroys germs but also their toxin, both in the test tube and in the body.

Now, the more important question. For argument's sake admit that the body does destroy germs and their poisons with enzymes, that the enzymes are the agents of immunity. Can we produce these enzymes outside the body and lend them where there is need? Can we substitute the flask and test-tube for the horse in producing antitoxin? It seems to me to be probable, although not yet proved.

The published results of Emmerich and Loew are very noteworthy. They seem to show that if the green pus enzyme is injected into the body it is quickly destroyed, but if it is first made to unite with blood or with spleen pulp a molecule is produced that can circulate in the body, for a time at least long enough to attack bacteria or their toxins. With such a substance they report curative results in several of the bacterial diseases.

I have gone over a part of their work, and so far as I have gone I can confirm it. My results, however, have had thus far to do with bacteria in test-tubes only.

But whatever the results, I feel sure we are on the right track. We are studying the disease-producing organisms, learning the agents with which they work. Little by little we are learning how the tissues combat these disease-producing agents. When we know these things then will we be ready to give intelligent aid.

XL. TWO CASES OF GRAVES' DISEASE SUCCESSFULLY TREATED AS INTESTINAL AUTO-INTOXICATION.

BY CHARLES L. MINOR, M. D.,

ASHEVILLE, N. C.

Ever since Graves, in 1835, first clearly outlined the symptomatology of the disease which, in English-speaking countries at least, bears his name, and which in Germany is called after Basedow, whose first article dates from 1840, the profession has been divided as to the etiology of this most interesting trouble, and the literature has become so large that Buschan, writing in 1895,[1] reports nearly a thousand articles as written on it to date, while Moebius' article in Nothnagle's System[2] refers in an incomplete bibliography to 882.

For many years the neurogenic theory which had the powerful support of Charcot promised not only to supplant the earlier hematogenic theory in popular favor, but also to win general and final acceptance, and such good and recent authorities as MacKinzie and Ord,[3] Fr. Kraus,[4] and Buschan,[5] still support it.

Since 1886, however, when Moebius first advanced his thyrogenic theory,[6] which ascribes the disease to a poisoning of the body through a diseased activity of the thyroid gland, to which the nervous symptoms are secondary, there has been increasing tendency to its general adoption, and many prominent men have spoken strongly in its favor, among others Kinnicutt,[7] Eulenberg,[8] Hurthle,[9] Wood and Fitz,[10] Starr,[11] Nothnagle,[12] Murray,[13] Notthaft[14] and Anders,[15] while Osler,[16] both in his practice and in his article in "Wilson's Text-Book of Applied Therapeutics," while not committing himself, seems to give most weight to this view.

But whichever of these views we adopt, and it would seem that an unassailable case is made for the thyrogenic theory by the antithesis pointed out by Moebius between myxedema and Graves' disease, by the pathological findings

in the glands, by the results of surgical treatment, by the cases of myxedema following on Graves' disease, by the reported cases of Graves' disease following thyroiditis,[17] and by the reported cases of the effects of excessive thyroid feeding, notably, one by Notthaft,[18] and another by Béclère,[19] there still remain many questions to be answered. We still can not say whether the symptoms are the result of an overproduction of a normal secretion (hypothyroidism), or due to the effects of a perverted one (disthyroidism);[20] we are still in ignorance of the primal cause or causes of such increased or perverted activity, and Kinnicutt truly says,[21] "The ultimate cause of disease of the thyroid is still a matter of speculation." Various authors have propounded views on this point; many things have been held accountable for the beginning of the trouble, and each in certain cases probably acts as a causative factor of the abnormal thyroid action;[22] a uniform causation doubtless does not exist; yet every addition to our knowledge in this direction is of value in the establishment of lines for the treatment of future cases, and it is to throw some light, if possible, on this question that I have ventured to-day to ask your attention to the report of two cases of Graves' disease treated, and in one case, at least, I may safely say, cured on the theory that it was dependent on an intestinal autointoxication.

In a fairly thorough search of literature I find that scarcely any authors have given this question of the causative relation of intestinal toxemia to exophthalmic goitre any attention. A few refer to the value of intestinal antisepsis, Solis Cohen[23] and Brower[24] among others, and some remarks on dietetics are made by most, but W. H. Thomson[25] is the only one I can find who has given it serious attention.

His articles in the *New York Medical Journal* and New York *Medical Record* are most suggestive and worth careful study.

Even Bouchard,[26] in his classic book on autointoxication, does not mention the subject; yet recalling the oft proven virulence of the ptomaines produced in the intestine and their violent effects on the nervous, vascular and glandular systems, what can be more reasonable than to suppose that they have some effect in the causation of a disease so often

ushered in, or rather preceded, by digestive disturbances, diarrhea, flatulence and chlorosis; in a disease the majority of whose victims are of that sex whose bowels are so rarely free from fermentation and ptomaine formation; in a disease in which Chevalier, Barnet and Silbert[27] have demonstrated the presence in excess of ptomaines in the urine, pointing to a probable fermentation in the alimentary tract; in a disease in which urticaria, angeioneurotic edema, and dermographism, troubles so frequently associated with intestinal putrefaction, are so common? The cases which I will now report throw, I believe, some light on this subject, and in conjunction with the large number reported by Thomson[28] justify the belief that certain cases of Graves' disease are of intestinal origin.

The first history is as follows: The patient, Miss F. C., aged 22, birthplace, and residence until 1895, Raleigh, N. C., since that time Asheville, N. C., was first seen by me May 29, 1897. Family history good. Free of any neuropathic taints, save that maternal grandmother was a rather nervous woman. Her childhood was healthy, with nothing to note save frequent tonsilitis. Her female history was perfectly normal. In her seventeenth year she had typhoid fever with no sequelæ; malaria of tertian type frequently. No pulmonary, rheumatic, renal, cardiac or neurotic history, and according to elder sister's statements, which agreed with my previous knowledge of her, she was even-tempered and not excitable, and of an unusually sweet disposition. The digestion prior to 1893 was good, though she was subject to constipation, and the appetite was always capricious, she being an imprudent eater. Sleep in health was good; average weight in health, 130 pounds; surroundings of the best.

Present history. Dates to summer of 1893, when on account of numerous malarial attacks she was taken to Massanetta Springs, Virginia, and here, for the first time, began to have attacks of acute indigestion, characterized by violent pain in lower abdomen, coming on about two hours after eating, not accompanied by diarrhea, and generally traceable to indiscretions of diet. Dr. Latimer, of Baltimore, diagnosed, her sister tells me, malaria, and told her the patient needed exercise and diet, or, as he put it, beef and a bicycle. The attacks continued at intervals during a school session in Paris, and after her return to America and removal to Asheville, where she had one attack so severe that she was told it had threatened peritonitis.

I may here state that I saw a sister of hers in an attack

said to be identical, which was an enterocolitis of severe form, from imprudences of diet. This was her last attack, save a very slight one at Christmas, 1896, but the flatulence persisted. At this time her complexion was unusually fine and fair, but in the fall of 1895, after much social overexertion, she noted that she was getting pale and felt dragged out, had poor appetite and slight fever. I, while not at this time her physician, saw her frequently, and noted the advance of what seemed to be a very typical chlorosis, as far as one could judge by inspection, and which was accompanied later on by a roughness and pimpling of her formerly beautiful skin. Her doctor advised tonics and diet, of which the heedless patient failed to avail herself with any persistency. In the fall of 1896 she first noted, as the result apparently of much exercise, which she took on the doctor's orders, a rapid heart action for which she was put to bed, but without benefit. In January, 1897, a diagnosis of Graves' disease was made, and in February she was sent to Baltimore, to be treated by Dr. Osler in a private room in Johns Hopkins Hospital.

The most careful inquiry fails to show any worry, anxiety, fright or other such nervous shock as might be looked on as an etiologic factor. Through the kindness of Dr. Osler, I have obtained a copy of the notes on her case while there; these show that at that time she was complaining of palpitation, nervousness, irritability, weakness, anemia, loss of weight (twenty pounds since July), dyspnea, especially on exertion, and consciousness of her heart beats. The examination showed the first sounds of the heart followed by a slight whiff all over the cardiac area, but most marked in pulmonic; no accentuation of second pulmonic. Apex in fourth space, within nipple line, action tumultuous, exophthalmus, pupils dilated, patient very nervous and flushes readily, pulse from 80 to 140, temperature 99.5° to 101.2°, respiration 16 to 24, weight 113 (was 133 in July). Urine normal, bowels regular.

The treatment included electricity, belladonna, digitalis, nux, ice-bags and rest, and she was discharged March 26th, somewhat improved. In her words, the benefit was slight, but evident, and its effects were lost soon after returning home. I took charge of her May 29, 1897. At this time I took above history and noted following findings: Lungs negative; heart, a blowing systolic murmur loudest over mitral area, but not transmitted to axilla; *bruit de diable* in neck; noise of heart sounds heard by patient in ears constantly; pulse 130 while at rest, regular; nervous system irritable, patient having lost her former even temper, and is so cross as to be hard to live with; slight tremor. Digestive

system: Evidences of active intestinal fermentation with overdistended intestines; tongue coated; breath foul, costive. Moderate degree of exophthalmus, most marked on left. Graefe's sign absent; Stellwag's symptom present; thyroid gland visibly enlarged, especially on left. Circumference of neck 12½ inches (her normal I do not know, but should judge it at about 11 inches). Skin muddy, with acne eruption; weight 123; strength poor; hemoglobin 65 per cent. (Fleischl); no blood count made; sleep poor. To my knowledge the patient, who lived in a home where overrich and highly seasoned dishes were the rule, and a simple plain diet the exception, was a most capricious eater, eating at any and all hours as the mood struck her, and very fond of candy, and was with difficulty induced to obey any orders.

With such a history and such findings, the diagnosis of Graves' disease needs no defense, and will not, I think, be disputed. We have a typical case, with most of the classic symptoms coming on gradually in a young girl in a sequence of a chlorosis, which was accompanied and probably preceded by a marked intestinal fermentation, and which had not yielded to the best treatment along the regular lines. The problem was, then, to find a proper plan for its management, and after an unsuccessful trial of the usual remedies—ice, electricity, belladonna (which gave her some comfort), arsenic, ergotin, digitalis, and lastly thymus and suprarenal extracts, from which, by the way, I got no results—I felt justified in putting into practice a treatment which, I thought, if the theory of her case I had formed was right, should yield results.

The facts noted above had satisfied me that there was a great probability that the disease had developed, not with, but as a sequence of, the intestinal troubles and chlorosis, and that a removal of these should benefit, if not cure, the former. I had not at this time seen Dr. Thomson's article in the August *Record*, nor those in the *Journal* of 1893 and 1896, but when I saw the former I was the more satisfied to put this treatment into effect. I was, moreover, anxious to test it, since a rather extensive experience with chlorosis and intestinal troubles in young girls had brought me more and more to believe that a majority of such chloroses are the result of ptomaine absorption (a view advanced long since

by Sir Andrew Clark, and which has not, I think, met with sufficient recognition), and can be cured on this basis; as the case in hand had undoubtedly begun as a chlorosis, with intestinal symptoms, and as this chlorosis had been immediately followed by the Graves' disease, it was justifiable to ascribe both to the same cause.

Acting on these views, I ordered a strictly regulated diet, in which almost all sugars were excluded, starches carefully limited, the patient being a great starch-eater; a few simple green vegetables, such as squash and spinach allowed, and underdone red meats and a little chicken, which, despite the views to the contrary, I have not found harmful in such cases, while tea and coffee, hot breads, made dishes, condiments and candy were all stopped, and only the simplest cooking allowed. Meals were to be at regular hours, and I at first demanded quiet on one floor of her house, but not rest in bed, later on allowing gradually increased walks and drives, and finally golf in increasing quantities, while all excitements and gayety were to be shunned, and early hours kept. As to medication, I limited it to a simple organic form of iron, the lactate and albuminate being chiefly used, and antifermentative mixtures, to be taken an hour after eating, the chief drugs used of this category being salol, resorcin, beta-naphthol, subgallate of bismuth and guaiacol, not forgetting an occasional mercurial purge.

My chief reliance, however, in combating the intestinal fermentation was a modified form of lavage, which I have thoroughly tested in many cases, with the best results, and which I call by the expressive, if not absolutely scientific, name of liver-washing. Briefly described, the patient at bedtime lies on the right side, with the hips higher than the shoulders, and with a fountain syringe allows from one quart to one gallon of water, at from 100° to 102° F., to flow slowly into the rectum through the usual rectal nozzle until the whole colon is full. The larger the quantity used the better. This water is to be retained for one-half an hour, which is soon possible, and is then evacuated. Clinical experience, as well as deductions from well-known physiological facts, justify me, I believe, in thinking that, aside from its excellent diuretic effect, a large part of the water is absorbed by the

intestine, reaches the portal blood, and thus the liver, which it washes out and stimulates to greater activity as a poison destroyer, increases the flow of bile, and thereby aids in disinfecting the bowel and lessening putrefaction. Aside from this, free diuresis is produced, and, if the water is hot enough, diaphoresis as well, thus powerfully disintoxicating the system. Certainly the results of a long use of this remedy have satisfied me that such is its effect, and certainly the case in point was no exception. The lavage was for a time used nightly, then at longer and longer intervals as the conditions demanded, but was not finally stopped for more than a year.

Knowing the unwillingness of the patient to obey orders, and the difficulties in her case of securing a proper carrying out of a dietetic and hygienic treatment, I had a plain talk with her in the beginning, and refused to go further without the promise of absolute obedience, which I secured, and which, with occasional falls from grace, was fairly faithfully given me. By July 12th fermentation was less; she was less irritable, and the neck measured 11⅛ inches; the pulse 112. August 9th color was noted as improving, but an imprudence of diet on the 17th was followed by indigestion, and eyes became again shiny and more protuberant, and the pulse rose to 132. September 1st, after a more careful observation of the rules, there was noted a gain of color; hemoglobin had reached 80 per cent. (Fleischl). The anemic murmur was no longer to be heard; the subjective sounds in the ears were less; there was not so much fatigue on exertion, and the family remarked much improvement in temper. Pulse 104. Another dietary indiscretion on the 20th, consisting of a dinner made up of raw tomatoes, grated corn, mutton, sweet potatoes, okra fritters and baked apples, produced some return of intestinal trouble, as might naturally be supposed, with a return of symptoms, and having read by this time Thomson's article in the July *Record*, I put her on a koumiss diet, but finding after a few days an inability or an unwillingness to abide by it, I substituted diluted milk, which agreed well. A week later the pulse was 96, the neck measured 11¼ inches, the complexion was much better, the weight was 130 pounds, seven pounds since May. October 2nd, some return of flatulence and discomfort of stomach, and sense of fullness after meals; tongue coated, pulse 108 and patient irritable. Ordered hot water before meals, and mist. rhei et sodæ. By December 27th, she being by this time back on a cautious diet, color was good, the pulse 96, neck 11½, bowels regular, very little flatulence, nerves

steady, appetite good. February 17th the pulse was 88, the neck 11½, weight 133¾, no flatulence, a better color and complexion. March 19th weight was 133¾, pulse 72, eyes seemed entirely normal, neck 11½, temper good, color good; eats well and prudently, bowels regular, no flatulence, feels strong. April 12th, weight 138, pulse 80, after playing golf all morning (she was allowed gradually increasing amounts of this game until she could play nine holes), tongue clean, no flatulence, digestion good, complexion nearly as perfect as formerly, color admirable. On June 9th I note an apparently complete *restitutio ad integrum*, with the possible exception of a slight prominence of thyroid, which yet would not be noticeable save on close observation.

At this time she was allowed to go to Europe, where she has since been; I have heard from her at frequent intervals, and am glad to say there has been no return of any of the symptoms, the heart is normal in its activity, not even being excited by mountain climbing and bicycle riding, in which she has indulged freely; the digestion is good; the nervous system normal, and she writes me she feels as well as she ever did. She has become engaged and will shortly be married; let us hope this will bring about no return of her malady, although relapses in Graves' disease, even years after a cure, are not uncommon. Some may doubt if the cure in this case, whose completeness can scarcely be doubted, was the result of the treatment recorded or one of those fortunate remissions which sometimes come in this trouble, but I think from the facts presented, the failure of other treatment carried out by so able a man as Dr. Osler, by the relapses during the course of treatment, due to imprudence in diet, yielding on a return to strict diet, that I am justified in asserting that the measures used produced the results.

The only other case of this trouble which I have treated in this way, and which should probably be reckoned one of Marie's "*formes frustes*," which came under my care through the kindness of Dr. Ambler while I was treating the above case, though not reported so fully, my record not being as complete, was also much benefited by this plan of treatment.

The patient, Mrs. D., first seen by me September 27th, was a married woman, age 47, of English parentage, but resident in America thirteen years; occupation, housekeeping. Family history negative, previous history entirely negative; married at 32, five children; last labor, five years ago, tedious. Slight malaria, rheumatic history, not nervous until

the last few years, weight in health 142, at present 130, great tea-drinker, no alcoholic habit, a fast eater, as I found—a gourmet and gourmand.

Present trouble dates from May, 1897, when, after a wetting, got cold, with fever and a bilious attack and vomiting of bile, and pain at base of right lung in liver region. The temperature lasted two weeks and ran from 101° to 102°. A doctor suggested laparotomy, but she only used hot douches and rest in bed and got well. During July felt poorly, and after eating had pain in the stomach. On September 1st had a fluttering in pit of stomach and a sinking feeling, and one night had a severe attack, with severe pain in bowels, hot flushes, very rapid pulse and fear of impending death. At this time she called in Dr. Ambler, who found her pulse 160. Great anxiety and pronounced pulsation of abdominal aorta in epigastrium. Bowels had been loose, but were then costive. After this she had returns of similar attacks, especially the tachycardia. On the 10th I noted pulse 120, tongue coated, strong pulsation and systolic *bruit* in epigastrium, below heart, to left of nipple line, so marked as to suggest aneurism. Liver normal; lungs normal; heart, save for rapid action, normal. Confessed to excessive tea habit, flatulence, and the custom of eating between meals whenever she felt hungry. Globus hystericus. Eyes shiny, but only slightly prominent. The thyroid showed a medium-sized enlargement on the left side, hard to the touch, and which had existed for years. The treatment was similar to that in the last case, with the addition of belladonna and digitalis, on account of the tachycardia, which it seemed to benefit.

The improvement was marked; the attacks of epigastric pulsation and tachycardia, which had so frightened her and caused fear of death, were very much improved, as was also the digestion, although it was with difficulty that I prevented her from indulging her large appetite. On discharge the pulse was 80, the eyes still rather shiny, the attacks entirely removed, the old struma unchanged, but in the two years which have since elapsed she has, according to her own statement recently made to me, had no trouble and feels perfectly well.

I fully realize, gentlemen, that I am not justified in drawing large conclusions from these two cases, but I believe that I can safely say that they show that some cases of Graves' disease at least have their origin in intestinal fermentation and the poison subsequent thereto, that treatment directed

to removing this fermentation and this poisoning can cure such cases, and that the profession should pay more attention than they have in the past to the intestinal condition in Graves' disease. I can not begin to surmise what percentage of cases would present such an etiology, but from the references in literature to flatulence and digestive disturbances in this trouble, from the large number of cases reported by Dr. Thomson, and from those symptoms of Graves' disease which, as I have already said, are in other troubles so frequently the result of intestinal intoxication, I feel sure that their number can not be so small. The other cases that it has been my good fortune to treat I have handled in the regulation way, and without, I must confess, very satisfactory results. While digestive disturbances were uniformly present, I did not then give them the special attention which I did in these cases, nor had I then become as satisfied as I now am that autointoxication plays so large a rôle in so many different diseases, and did not, therefore, direct special attention to that factor.

If my contention, as presented above, is right, I believe it lends strength to the view so ably presented by Eulenberg[29] and Hurthle,[30] who consider the abnormal thyroid activity to depend on the circulation in the blood of some poisonous product—in these cases intestinal ptomaines. If I am right, I feel that no doctor treating this trouble can be justified in minimizing the rôle of autointoxication of intestinal origin in Graves' disease, and I am sure that a more careful attention to it, not only here, but in many other troubles, will fully repay the physician, and I trust that those of you who have now, or shall have, cases of Graves' disease or chlorosis under your care, will give this method a fair and unprejudiced trial in suitably selected cases, and keep careful records of your work and report them at their completion. Only thus can we expect to clear up the etiology of this obscure disease and place it on a foundation of accurate clinical experience.

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DISCUSSION.

DR. GEORGE H. WEBSTER, of Chicago.—The present and the past treatment of exophthalmic goitre is based on the assumption that the disease is caused by an increased activity of the thyroid gland, and that this increased secretion may or may not be altered in quality, and the continued action of this either increased or altered secretion upon an unusually susceptible nervous system. That is the theory as it has been accepted until recently, but, as you see, that leaves a very important missing link. It furnishes absolutely no clue whatever to the cause of this increased or perverted activity of the thyroid gland. Reasoning from analogy, no gland in the organism takes upon itself any increased or altered excitability or activity without cause. There must, therefore, be a cause for the increased activity of the thyroid gland. Therefore, the paper which has been read this morning seems to me to be one of the most important contributions to this subject which it has been my good fortune to hear, and I congratulate the doctor. There have been one or two others contributed

recently, in which one author treated the case with large doses of bile, giving as high as several hundred grains in the course of the day, possibly with the idea that the bile acts as an intestinal antiseptic and would therefore bring about a cure. Of course, we cannot draw important conclusions from one or two cases, for we must remember that the records show that 50 per cent. of all cases of exophthalmic goiter recover, some under influence of rest and simple treatment, some by injections of iodoform into the gland, and others by section of the cervical sympathetic, or by removal of a portion of the gland itself. The object of this treatment is to lessen the secretory activity of the gland, still it furnishes no clue for the increased activity or perversion. Dr. Minor's paper gives us at least one clue, and must therefore be considered an extremely important contribution to this very important subject.

Dr. Hugh T. Patrick, of Chicago.—I regret exceedingly that I did not hear the beginning of the paper, but I came in in time to hear the conclusions and the suggestions which the doctor made. If the paper is to be regarded as a report of two cases, and as a suggestion, it passes beyond all criticism. If he intended it to be an explanation of the etiology and nature of Graves' disease, I think it ought not to pass without a challenge. I do not think that any one knows the pathology or etiology of Graves' disease, and I do not believe that the etiological factor lies in the intestinal tract, nor in any poisons absorbed from it. It goes without saying that care of this tract is proper in this disease. Neither can it be disputed that an intestine containing noxious substances acts as a determining factor, just as does alcohol, loss of sleep, overexertion, and so forth. But to draw conclusions from two cases is going entirely too far, and is not a method to be recommended in the investigation of medical subjects. This disease has been investigated by many, and nothing has been adduced which could be considered as proof positive that autointoxication from the intestinal canal could have an imporant bearing as an etiological factor. As to results, Dr. Webster might have gone on indefinitely, as diseases of this nature have been cured by many remedies. I have seen possibly a hundred cases of this disease, and have seen them treated in all manner of ways, by surgical means, hydrotherapy, electricity, galvanic, static and faradic, heart tonics, such as digitalis, strophanthus, aconite, and so forth, rest in bed, as well as graduated exercises. I have seen only one case of Graves' disease which did not improve under treatment. This case was treated in different hospitals and

dispensaries, and by various doctors, and was about ready to die. The patient then decided that she would like to be taken home, and her wish was complied with. Within three months she was perfectly well, and without any treatment whatever.

DR. MINOR (closing the discussion).—I am sorry that Dr. Patrick did not hear all of my paper, as I would not endeavor to present two cases before this body, and make a positive statement. I stated in the paper that we had determined that the thyrogenic theory is a positive one, as put by Nothnagel and Kinnicutt, but that we must find out the primary cause, and I have tried to show in these two cases that the intestinal condition was the primary cause of the disease, and I feel that I have run down one of the primary causes of this condition. I find that little attention is paid to the condition of the intestines, most authors devoting their time and attention to dietetics. I believe that a certain percentage of cases of Graves' diseases will be found to be due to an intestinal intoxication. In others it is due to a certain fright or shock, but I believe it is worth while finding out at least one cause, and especially so when the attention of the authors has not been especially directed in this line of research.

XLI. INTESTINAL AUTOINTOXICATION—ITS PREVENTION AND TREATMENT.

BY WILLAM F. BARCLAY, A. M., M. D.,

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The anatomical conformation of the human body is illustrative of divine wisdom in all its parts; it is truthfully written ten that man is fearfully and wonderfully made. The student of anatomy is impressed by intimate study of the parts embraced in the abdominal cavity in the relation which they sustain to the nutrition of the body. It is more especially in consideration of the organization of the three great compartments of the body, the cerebral, pectoral and abdominal cavities in the intimate relation which they sustain to each other, the limbs being important in apprehension and loco-

motion—neither part can be disturbed without detrimental influence to the physical economy of the whole body. The organs contained in the abdominal cavity preside over digestion, assimilation and nutrition; also, secretion and excretion of the waste products of the body. The intestinal tract or canal is the part included from the stomach to the anus, being divided into small and large intestines. The first part constitutes about four-fifths of the entire length, beginning at the stomach and ending in the right iliac region, and is divided into the duodenum, jejunum and ileum. The large intestine begins in the right iliac region, ending at the anus. It is divided into cecum, colon and rectum. The first part of the intestinal tract contributes to chylification and absorption of the chyle, the second part acts as a reservoir and excretory canal. It is important in these studies that the regional anatomy of the intestines be clearly defined and understood, also the blood and nervous systems which contribute to the anatomy of the intestinal tract.

A careful study of the anatomy of the intestine in its muscular system, and the arrangement of the glands, serous and mucous membranes, is consistent in a clear comprehension of intestinal autointoxication.

Autointoxication, with infection, is self-contagion in the sense of self-poisoning. In the comprehension of the anatomy and physiology of the intestinal tract and its functions, normal and abnormal digestion and assimilation are considered in their relation to life and death.

Dr. Beaumont's observations upon the person of Alexis St. Martin are the most interesting and reliable which have been made. From the facts obtained we are enabled to affirm the part sustained by each organ until the food passes the pyloric end of the stomach and enters the intestine. It is in observation that we arrive at conclusions of more or less practical value in the management of pathological conditions. It is not important to the sick that we understand the pathological conditions present if we fail to apply the means which will afford relief and effect cures.

"Teach me how to live" is the vital question presented in every sick call, as disease is almost invariably the result of violation of some natural law, of known or unknown exist-

ence in the economy of life. The histological forces tend to the formation of organized tissues, being modified by antagonistic influences. The natural laws which determine the processes of the secretions and excretions of the body are harmonious in their equilibrate actions, and conserve the functions in the nutrition of the body and the elimination of waste products in the physiological actions of organic life. The inherent conformation of the parts and their functions are at all times dependent upon laws which tend to preserve life and health, but are modified by influences which are innate, as well as the laws of environment.

It is no less wonderful than instructive that the modification and arrest of vital functions in the alternation of the secretions and their toxic properties do not disturb vital forces to a greater extent than is as yet apparent in pathological results. Careful observation and study of the excretions of the body enable the student to understand their normal conditions and the constituent equivalents of their composition.

The various organs of the body perform a consistent part in carrying on the equilibrate economy of life in the secretion of the nutritive and eliminative functions in their relation to each other. Abnormal conditions of the excretions do not definitely indicate disease of the part from which the excretion is obtained, but may elucidate the contamination of the same by reabsorption of effete matter. In the reabsorption of effete toxic matter ptomaines are formed in natural processes, as well as other products which are inimical to life.

If the conservative vital forces are overdone, toxalbumen poisoning is the pathological result in the elaboration of metabolic action.

The infection of the body by acute or chronic ptomaine poisoning is established by the most unmistakable evidence in total subversion of the living forces to the influence of the toxic effect of effete matter in the blood. It is evident that the origin of disease is frequently not suspected when in fact it is an intestinal autoinfection. The etiology of intestinal autoinfection is in the imperfect digestion, assimilation and absorption of toxic material which the vital forces are unable to render fit for the normal nutrition of the body.

The elective action of the function of absorption in the intestinal tract is a study of profound interest in the normal digestion and assimilation of food. That only certain parts of the ingesta are of apparent fitness to be absorbed and supplied to the circulation for elaboration is to the physiologist a complex vital process, imperfectly understood. When the chyle enters the circulation it is elaborated and certain effete products eliminated which are toxic or nontoxic in their nature.

It is proper that intestinal autoinfection be studied from clinical observation as to etiology, characteristics and prognostication. It is easily within clinical differentiation to clearly define acute, subacute and chronic intestinal autoinfection.

The causes are so varied that I will only mention the more usual apparent exciting causes of intestinal autoinfection; food, drink, heat, cold, and varied toxic influences of internal and external origin. The acute forms of intestinal autoinfection readily occur in the study of cholera morbus, and the different forms of intestinal disease in adult life, incident to the use of unwholesome food, taken at irregular hours, as well as sudden changes of temperature, are the frequent causes of this disease. Cholera infantum and the disorders of the intestinal tract in infant and child life are the intestinal diseases caused by autoinfection, which are the most difficult of treatment of the diseases incident to early life of children.

The causes are too apparent to require serious consideration in this discussion. They readily occur to the physician in the study of this most dangerous class of disorders, incident to infant and child life, forming so large a part of mortuary reports. It is evident that acute intestinal autoinfection is so considerable a part of clinical studies that we may not omit the consideration of this group of diseases without serious inconvenience in the study of autoinfection. A careful study of cholera morbus, cholera infantum, and other acute intestinal affections clearly points out the clinical features of acute toxic poisoning. No one acquainted at all with the fatal character of cholera morbus and cholera infantum has failed to observe the general depression of all vital powers,

as well as the general relaxation and the disturbance of all the functions. The heart in its action, and the general circulation, especially the capillary system, clearly and unmistakably indicate there is great loss of vital strength, extreme nervous exhaustion, which portends danger to life or the ultimate death of the patient, unless well directed means are employed for restoration of strength, and the recovery of loss of vital force. The toxic condition of the blood which is manifest in a tedious convalescence is the result of the impaired condition of the nutritive system, with nervous prostration. Infant and child life suffer most from the different forms of acute autoinfection.

The mortality reports are almost incredible as to the death rate from autoinfection of intestinal origin. Sanitarians devote more time and money to prevention and cure of these affections than all other diseases incident to infant and child life. The causes mentioned constitute the greater part of the etiological factors of these affections. No one will for a moment doubt or underestimate the value of the preventive measures used in the intestinal diseases incident to infant and child life.

Subacute intestinal autoinfection is that form of toxic poisoning which is less pronounced in its characteristics in adult, infant and child life, being more amenable to treatment, and marked by rapid recovery after the disease is controlled by proper care and medical treatment. It may be remarked that the subacute form of the disease is usually controlled by the removal of the cause in the selection of food and drink.

Chronic intestinal autoinfection is the form of this disease which has claimed largest consideration by medical writers. The profession of medicine is indebted to Dr. Bouchard for the first learned discussion of autoinfection and the consideration in particular of the varied toxic agents which are generated in the laboratory of the living organism, and the effect of toxic germs on the health of the human family.

The recorded observations of experiments made by Dr. Bouchard are of the greatest scientific value, and the well known observations of various authors on the value of antiseptic treatment are the greatest advances made in scientific medicine. The etiology of autoinfection of intestinal origin

is the intoxication of the system by absorption of toxic products generated in the intestinal canal. Typhoid fever is an acute intestinal autoinfection due to a specific infection. The more clearly the physician comprehends the pathological conditions present, the more definite the antiseptic measures used, the self-limited course of the disease will be defined.

Improper food, retention of excrementitious matter, altered secretions and other causes set up putrefactive changes, and result in generation of toxins which cause autoinfection.

Chronic autoinfection of intestinal origin is the slow development of these pathological conditions, malnutrition, with altered cell development, which is portrayed in varied pathological manifestations. It is certain that no subject affords a better field for scientific investigation nor is the complexity of this subject easy of solution. Most likely the condition which induces heterologous growth is established, and thereby the various abnormal aggregation of ulterior tissues which form tumors of benign and malignant character result.

Cellular pathology has thrown much light upon this heretofore abstruse and incomprehensible subject in medical science; we anticipate the dawn of advancement in scientific progress. When the cause of unknown pathological manifestations, as altered cell growth, formation of adventitious tissue, is clearly understood, the remedy will be discovered for the alleviation and cure of those at present incurable diseases.

Degeneration disease is no doubt attributable to this cause in changes manifest in all tissues of the body.

Adventitious deposit and growth of low forms of degenerate tissue occlude blood vessels, shut off supply, lessen growth, weaken the activity of the various glands whose products enter into the processes of digestion, assimilation and nutrition in building normal tissues.

The normal growth is modified by disturbed vital process in waste material rendered unfit for use in tissue building by toxalbumens furnished the blood by autoinfection. Nutrition is life itself, in the chyle the elements which sustain life exist, which are appropriated in the blood for sustenance. In the disposition of the chyle in the blood certain effete products are formed, and eliminated by the liver, kidneys,

and bowels. The reintroduction of these effete products in the body demonstrates how disastrous is their presence in the blood, in a train of symptoms which denote toxic poisoning.

It is a most insidious condition of the blood induced by continued malnutrition, the consequence of a septic ptomaine poisoning. The condition described as acute ptomaine poisoning, known to general practitioners of medicine, caused by ultraintestinal changes in different kinds of food, in decomposition of soft shell fish, meat, salads, ice cream, vegetables, fruit which readily decomposes and through chemic changes forms toxic compounds of a most deadly character. The reverse condition, known as chronic ptomaine poisoning of intestinal origin, comes on with a train of characteristic symptoms not observed in other diseases. The removal of the conditions which excite intestinal autoinfection, with a continued course of treatment, will effect a permanent cure of this most deadly malady. The changes in blood-making organs of the body, in the lymphatics, blood vessels, liver, spleen, pancreas, and other glands, are restored by hygienic, dietetic and medicinal treatment of considerable duration, with prospective healthy secretions and normal conditions. The causes which tend to intestinal autoinfection are various; bad food, improperly prepared food, rapid eating, overeating, catarrhal conditions of the respiratory organs, constipation of the bowels, the use of syringes for regulation of the bowels being at all times a most fruitful cause of a condition of the bowels which can only be induced by a practice which can not be too positively condemned, and to which cause thousands of otherwise healthy organizations are permanently injured, and numberless lives sacrificed. It would be a blessing to humanity if syringes had never been invented and used. I can not make too emphatic the condemnation of the disastrous effect of the use of syringes upon the parts to which they are applied in the mistaken apprehension of their use in cleanliness and the removal of the contents of the lower bowels. Intestinal indigestion, with flatulence, is perhaps the most prevalent of abnormal conditions, which the general observer emphasizes as the result of improper methods of living.

The symptoms, subjective and objective, of intestinal auto-

infection are so insidious and deceptive that the general observer as a rule is misled, and the real conditions overlooked.

The diagnosis of intestinal autoinfection is at all times difficult in distinguishing the differential diagnosis of stomach and intestinal indigestion. Indigestion is almost invariably attributed to some pathological condition of the stomach, when in fact the condition referred to the stomach is correctly intestinal in its origin. The large use of agents for correction of disturbances of the stomach is being discontinued by physicians in their daily routine practice, and the more essential and rational use of antiseptics is being employed with great advantage to suffering humanity. The condition of the tongue is at all times of reliable diagnostic significance, as well as a peculiar cachectic appearance of the skin, with the alteration of the glandular excretion of the skin.

Headache in the morning is a significant symptom, with languor and a general depression of nervous action. The foul breath, with decayed teeth and a general offensiveness of the excretions, is pathognomonic. The pendulous abdomen, distended stomach, with eructation of malodorous gas, borborygmus, is indicative of fermentation of the contents of the intestinal canal with generation of gas, headache, drowsiness, disturbed sleep, with unpleasant dreams, and a general disposition to be irritable in disposition, with occasional melancholia. There is a disposition to the formation of adipose tissue, with muscular relaxation from degeneration of muscular fibre, especially of the heart and other organs of the body. Palpitation of the heart is a frequent symptom of intestinal autoinfection, caused by pressure of the abdominal organs upon the diaphragm. Night sweats are in the advanced stages of intestinal autoinfection a frequent alarming symptom. Women suffer more than men from intestinal autointoxication on account of sedentary habits, wearing of tight corsets and clothes which impinge upon the abdominal viscera and impair their normal functions. Women, more than men, suffer from eating confectionery, pastry, and other unwholesome diet. To be the monitor of the female appetite will display the hazard to which the digestive organs of women are exposed in the varied amount of unwholesome

and indigestible matter which the powers of nature are taxed to digest and elaborate.

The inordinate use of all kinds of liquors consumed by man is a source of disease.

Other causes not enumerated will readily occur to the careful clinician in the study of intestinal autointoxication—intemperance, in its multiform aspects, is the final summing up of the causes of the varied disorders of digestion. It is at all times evident the food and drink which man selects should be chosen with reference to its palatable and nourishing qualities, and be taken in moderation.

Hunger is the natural result of the appropriation of food consumed to sustain life and health, in the normal waste of the physical forces in the sustenance of life.

A careful study of digestion and assimilation demonstrates that the time required is variable, being modified by the character of the food consumed, vigor of the organization, age and environment.

It is affirmed that food ordinarily consumed is entirely digested and assimilated in adult life in from four to seven hours, the time required in infant and child life being much shorter. It is believed from observation that food should be taken in adult life every four or six hours, in infant and child life every two to six hours. The taking of food three times per diem is a variable sanitary rule, which is modified by age, sex, temperature, exercise and other natural conditions. The waste products of the body are governed in their dejection by the same laws which govern the appropriation of food for the sustenance of life. The natural evacuations of the body require no less care, time and consideration than the taking of food.

The care of the body as to natural evacuations is a question that has not been satisfactorily solved by physicians with reference to the preservation of health.

The routine prescription and use of cathartics, as well as the daily use of all kinds of laxatives by the people is, of all questions in the practice of medicine, the most difficult of rational solution. It would seem that hygienic measures should solve this question in the selection of proper food, its healthful preparation, to be eaten at regular intervals, with sufficient

time for mastication and insalivation and taken in moderate quantity, overeating being at all times injurious. The attention to regular evacuation of the bowels is at all times a health assurance of paramount importance, rather than the use and abuse of cathartic medication.

The localization of pathological conditions in the intestinal tract and application of remedial measures is most difficult and at times grave lesions have been overlooked.

The total abstinence from food for considerable periods of time has been of valuable assistance in the treatment of intestinal autointoxication. It should at all times be the main procedure to ascertain by abstinence from eating and free evacuations of the bowels, with large use of water, the exact pathological condition or conditions which require care and treatment. Continued starvation or sameness of diet is injurious and the larger the variety of food consumed in moderation, the greater the success attained in the treatment of intestinal autointoxication. The use of liquids and milk as usually directed is injurious, as food of more material form is in accordance with natural resources in nature's plan of assimilation. The Indian maize so largely left out of food products is a defect in our system of food selection, being supplanted by bolted wheat flour, largely detrimental to good health. Those people who largely subsist on Indian corn seldom if ever suffer from intestinal autointoxication. Medical treatment is continuous if dietetics and hygiene are not considered in care and treatment of intestinal autointoxication.

Calomel easily stands at the head of the list of medicines, with strychnia when atonic conditions of the muscular walls of the bowels exist and the mucosa is relaxed and the natural vermicular actions of the intestines impaired. The ignatia amara is of great value in treatment of the disease when the heart is affected and irregular in its action, with fatty degeneration. The natural mineral aperient waters, the Apenta, Hungary and Carlsbad being specially indicated, only being objectionable in not being of uniform strength. The natural waters of various laboratories are affected in their thermic properties by causes consistent with evolution in natural resources. I may be pardoned for refer-

ring to the solutions of gold with arsenic, gold with arsenic and mercury (arsenauro and mercauro) given after eating, largely diluted with water, in rather small doses, 5 to 10 drops, with papoid and soda, before eating, in small doses, 1½ grains of the former with 5 grains of the latter. To these remedial measures special emphasis may be applied. The correctives and antiseptics are not of special use in therapeutic resource in treatment of intestinal autointoxication. The cool and cold baths are indicated and in many instances seem of incalculable value in the treatment of intestinal autointoxication. Water used internally and externally is of great value when the system is in a degenerated condition, as it usually is in intestinal autointoxication. Time only permits mention of remedial measures employed, not to mention the intolerable abuse of the vital powers by a long list of remedies which seem not to be indicated in the treatment of intestinal autointoxication.

It is, I believe, first important to clear the intestinal tract of offending matter, then abstinence from food for a variable length of time. The employment of bitters and tonics of a vegetable character have been mostly unsafe. An old but reliable formula is one ounce each of boneset and balm of Gilead buds in a quart of good rye whisky, allowed to become a bitter infusion, taken before and after eating. This has given most satisfactory results in treatment of intestinal autointoxication.

XLII. INDIGESTION IN INFANTS AND CHILDREN.

BY JAMES H. TAYLOR, A. M., M. D.,
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Inasmuch as indigestion is often due to a lack of knowledge of the digestive organs in their normal state, I shall preface my remarks with a few suggestions on the subject of digestion.

When the surgeon attempts to dress a fractured ulna, he bares the uninjured member for the purpose of noting the normal conditions.

It is just as essential that we familiarize ourselves with the apparatus of the infant's digestion in health before we endeavor to deal with these parts in disease.

Investigations have shown that the average capacity of the infant's stomach

At birth is	1½ oz.
At four weeks it is	2 oz.
At three months it is	4½ oz.
At six months it is	6 oz.
At nine months it is	9 oz.

The above must be borne in mind when considering the etiology of indigestion.

The only elements of food acted on in the stomach are proteids. These are changed into acid-albumen, albumoses and peptones, and this action is supposed to be accomplished through the agency of the pepsin and acid of the gastric juice.

According to Krueger, pepsin is present at birth, and even as early as the fourth month of embryonic life. Holt says: "The reaction of the stomach in fasting is acid, and at this time free hydrochloric acid can be demonstrated. Following a meal of human milk it is alkaline; after one of cow's milk it is acid or neutral."

Many good observers claim that very little digestion is carried on in the stomach—that is more of a reservoir into which the milk is received. It is further claimed that the milk passes rapidly into the intestine, and that in from thirty minutes to an hour after a meal of human milk the stomach of a young infant is often found empty. Where cow's milk is used, a half hour longer is required. Holt states in substance: "In the intestine the proteids, carbohydrates and fats are acted on by the pancreatic juice. The trypsin, which is active only in an alkaline medium, converts the proteids into peptones. In most cases a large part of the proteids passes, but little changed, into the intestine. The diastatic ferment of the pancreas has the power of converting starch into sugar. This action, however, is feeble during the first six months. The pancreatic juice actively emulsifies fat, even at birth. The functions of the liver, as indicated by its

large size at birth, are important in digestion. Bile assists in the digestion and absorption of fats; it also acts as a stimulus to peristalsis, and in this way aids in the absorption of all kinds of foods. Its diastatic action upon starch is very feeble.

From the stomach, the absorption of water, salts, sugar and peptones may take place directly into the blood. In addition to these elements, fat is absorbed in the small intestine by means of the villi and the simple follicles of the mucous membrane. There is little or no digestive activity in the large intestine, though sugar, salts and peptones may be absorbed with moderate facility.

Even in healthy nursing infants, complete absorption takes place only in the milk sugar. From 2 to 5 per cent. of the proteids and fats taken passes through the intestinal canal. In infants fed upon cow's milk the residue is from 1 to 3 per cent. greater. In cases of indigestion, the food residue is first in the proteids, next in the fat, and least in the sugar.

Two varieties of bacteria, the bacterium lactis ærogenes and the bacterium coli commune, are constantly present in the intestinal tract. Whether these are beneficial or prejudicial to healthy digestion has not been definitely determined.

With the foregoing in view, let us turn our attention to *disordered digestion* or *indigestion* in infancy.

Among the many causes of this disorder is overfeeding. The stomach is taxed beyond its capacity. The innocent mother attempts to pour four ounces of milk into her baby, whose stomach can not possibly hold but *two* ounces. The attending physician is too often responsible for this, and *his name* might be substituted for the word "overfeeding" in the etiological list. I never have seen indigestion produced by *underfeeding* (all other things being equal).

On the other hand, I have observed a large percentage of cases of indigestion where *overfeeding* was the sole cause, and many of these, I admit with regret, were among those I did not see in consultation.

The giving of improper food is an important factor in the etiology of indigestion. Undiluted cow's milk, with its firm, coarse, insoluble curd; some farinaceous article, any sort of a mixture that will run through the hole in the nipple of a

nursing bottle, and which the average infant that can not obtain the breast usually gets in the early days of its existence, will produce indigestion. It is at this period the *harm* is done. The infant spends the remaining part of its career, if it does not die from some intercurrent disease (for which the above named injury is responsible), in the hands of the doctor or proprietary-food vender in search of relief. I have emphasized these causes for the reason that I believe they are more frequent than is generally supposed; also, because my attention is so often directed to older infants suffering from some chronic disease which had its origin in an acute form of gastric or intestinal indigestion. And I feel confident that these are causes which, in a great measure, can be prevented. I certainly would not fail to mention atmospheric heat, cold, dentition, sudden weaning, the too early giving of solid food, the feeding of unripe fruits (especially to older children), etc. Each might be given an important place in etiology in individual and very obstinate cases of indigestion. Older children who fail to masticate their food, and who swallow their meals hurriedly, bring upon themselves very severe attacks of indigestion. Oftentimes they stand upon street corners watching parades until their extremities are thoroughly chilled, and thus the "cold" *here contracted* produces indigestion, diarrhea, and even death. And so we might enumerate many other causes which are directly or indirectly responsible for indigestion in infancy and childhood. I have been much impressed with the large number of infants born with an *extremely feeble nervous organization*—infants naturally predisposed to disease, in whom indigestion produced convulsions, which, if not resultant in death, induced a permanent derangement of the nervous system. But the two causes which, in my humble judgment, produce more annoyance in early infancy and terminate ultimately in serious secondary gastric and intestinal disorders are *overfeeding* and *improper feeding*.

I shall not consume any time in enumerating the symptoms, diagnosis, prognosis, etc., but enter at once into the discussion of a means of preventing indigestion, as well as a plan for treatment where the disease is established. It is safe to state that we encounter very few cases of indigestion

among babies fed at the breast. Assuming, then, that our patients are for the most part among artificially fed or bottle-fed infants, here is where we find a field for the prevention of a disease which is one of the most prolific sources of gastro-intestinal troubles of infancy or childhood—indigestion.

The first step in prophylaxis is to ascertain the weight of the infant and its gastric capacity. Instruct the mother or nurse on this point, and one of the chief obstacles, *too much food*, will be overcome. The second step is the selection of a *proper nourishment*.

It is unnecessary at this time, after what has been accomplished by Rotch, Holt and their many followers, to enter into detailed reasons why modified cow's milk is the best substitute for mother's milk, especially in the early months of infancy. Although a general rule may be adopted for the modification of milk, the details should be studied in its preparation to meet the requirements indicated by the physical condition and idiosyncrasies in each individual case.

A third step, and one of no little importance, is an observance of the proper intervals of feeding. The nurse should be taught the average time required for the stomach to empty itself, and the second meal should not be given before the first is digested.

By an observance of the foregoing and a careful attention to the cleaning of bottle, nipples, mouth, etc., much may be done to prevent a disturbance of the digestive organs. The best argument against the exclusive use of starchy foods in early infancy is the total absence of such elements in the food furnished by nature. There is, however, partial development at birth of the organs which take part in the digestion of starchy substances. Therefore, in the modification of milk, especially in individual cases, oatmeal water or barley water, which contain a minimum proportion of starch, may be used. The above is recommended by Jacobi, who claims to have derived excellent results, with no evil consequences.

As soon as digestion is arrested, the contents of the stomach act as a foreign body and an irritation is at once set up. The proteids, instead of being converted into peptones, remain in the form of albumoses, which have been shown by

experiments on animals to be toxic. The resulting congestion and catarrhal inflammation of the mucous membrane, and the rapid absorption of toxins is soon evidenced by the vomiting, high temperature, circulatory disturbances, diarrhea with stools containing undigested matter, restlessness, prostration, and other striking symptoms which occur, especially in very young infants.

Washing out the stomach and cleaning out the alimentary tract to rid it of all irritating substances, is the first step indicated in the treatment. The second indication is to insure absolute rest. All food, and especially milk, should be withheld until vomiting ceases. When vomiting subsides, albumen water, made by adding the white of one egg (with brandy and salt) to one pint of boiled water, may be cautiously administered. While drugs are usually of little value, I have observed good effects in twelve cases from the use of tincture of nux vomica and arsenite of copper. One-tenth of a drop of the former was given alternately every three hours with one one-hundred-and-fiftieth of a grain of the latter. The patients were from two to six months of age.

The milk diet should not be resumed until the fourth day or until all symptoms of disease have disappeared. If the symptoms of the intestinal form of indigestion predominate, the stools should be carefully examined from day to day, and the milk withheld until they present a normal appearance. It is in the intestinal variety that we find recurrent attacks, and soon there are observed symptoms of an alarming nature —symptoms which indicate that structural changes have taken place and some new disease has supervened. An attempt should be made to avoid this by a strict attention to diet. The abdomen and extremities should be kept warm throughout the entire period of the disease. With older children no solid food should be allowed, and even milk during the hot months is contraindicated until all symptoms have subsided. Barley water, and the various broths (strained) may be given at regular intervals. In these cases the nux vomica and cuprum arsenite should be given. Later, when all symptoms have subsided, pasteurized milk (to which formalin has been added in the proportion of one drop of a 40 per cent. solution to the pint) may be given.

In the selection of diet for this class of cases, and especially in the chronic intestinal variety, I have found excellent results from "panopepton." This is prepared by Fairchild Bros. & Foster, and is a very convenient and acceptable form for administering the nutritious elements of beef and wheat in a soluble and digestable state. It should be diluted with cracked ice, to which may be added champagne, brandy, or some light wine.

In closing, I trust that, in the presentation of the foregoing, I may leave the impression that the paramount duty of the physican lies in his efforts, first to *prevent* indigestion in infancy and childhood; second, in his awakening to the fact that many obstinate diseases result from indigestion. He may, by a careful understanding of the normal and abnormal conditions, and by a strict adherence to the simple means of treatment, obviate many serious gastro-intestinal troubles which worry the practitioner and bring so much suffering to our little ones.

DISCUSSION OF PAPERS BY DRS. BARCLAY AND TAYLOR.

Dr. Albert E. Sterne, Indianapolis, Ind.—The subject of autointoxication is one of such broad significance that it ought to be discussed thoroughly in all its phases. As is evidenced by Dr. Barclay's paper, he has given the subject very serious thought, and we all know that he is one of the first to have taken up this subject in this country. The results of autointoxication are so manifest, especially in chronic disorders, that it ought to apply to general practitioners more than any one else. The effect on the blood vessels is especially marked. I have noted degenerative changes in the arteries in innumerable cases of long standing, especially in diseases of the brain and spinal cord. The loss of elasticity, which the absorption of the toxic products from the intestinal tract frequently brings about, is a predisposing cause, which is manifested early in persons who certainly ought not to have any such cirrhotic condition of the blood vessels. Where this is incident to old age, it is a different matter, but where it is present in young people we must look

for some satisfactory explanation of this condition. The innumerable forms of persistent headache, severe changes in the kidney, especially of its arterial structure, which brings about another most serious form of autointoxication of a renal character, with the formation of the products of insufficient oxidation and the uric acid troubles, ought not to be classed under the head of intestinal autointoxication.

It seems to me that Dr. Taylor did not sufficiently emphasize one point in his cases. He is undoubtedly right about overfeeding, and the improper use of certain means of nutrition in infants, but there is one grave error, which physicians constantly make, and which he has not mentioned. That is, the manner in which they use milk. Milk is not digested and ought not to be. It is absorbed and therefore, it should be administered alone, so as not to cause the stomach to elaborate products which will produce indigestion. If milk is given alone, without any solid food whatever, it will cause very little trouble, not only in infants but in adults as well. It has been my practice to feed milk to patients who were so weak that they had to be brought in on stretchers, cases of so-called nerve exhaustion, where its use was followed by most excellent results. I gave small quantities only, but very frequently and at the body temperature. The common usage of giving infants solid food with milk ought to be strongly condemned as it is largely the cause of so many cases of acute intestinal disorders of childhood.

Dr. Henry B. Favill, of Chicago, Ill.—The topics suggested in these two papers are so many and so important that it is very embarrassing to attempt to discuss them at any length, and I shall not attempt to discuss in detail. Two or three things have occurred to me, listening to these papers, and particularly one or two considerations implied by Dr. Sterne, that I think it is worth while to talk about them a moment.

In the first place, in all of these days to come, when we are talking about autointoxications and autoinfections, and we shall be talking about them more rather than less as time goes on, it is important as a primary factor that we do not use the term autointoxication and autoinfection as synonyms. Infection has a distinct and definite meaning, and implies the presence of bacterial or other pathological infectious material, and that is the meaning which must be reserved for it. Intoxication has a different meaning. It means the contact or absorption by the organism of a noxious element. Those two things are fixed in nomenclature, as well as in pathology.

Infection may exist in the bowel, without intoxication. Such an infection is not an autoinfection. An infection which results in a further transmitted infection throughout the system is an autoinfection. An intoxication may exist from toxins in the bowel. An infection may exist without an intoxication. These conditions are separate. Intoxications arising from infections of the bowel are common subjects of observation; infections arising from infections of the bowel are subjects of different observation. Consequently it seems to me to be important in all our work in this territory hereafter that we be careful and discriminating of our choice of terms, as confusion will surely result. Moreover, we have a series of products developed in the intestines as the result of infectious processes going on in the intestines which yield toxins, ptomaines, etc. Let us consider those as a definite and distinct group developed in the intestine and absorbed into the general system. Let us set aside for the time being this class of toxic agents, and let us approach another class of things suggested by Dr. Sterne. This is the loading up of the system by products of imperfect metabolic activity, products which are essentially noxious, more or less destructive, and productive of degenerations. Products represented by xanthin, hypoxanthin, uric acid, etc., are the products of imperfect metabolic activity. How are we clinically and in our pathological researches to distinguish between the class of toxic agents which occur as the product of infectious products in the bowel and the class of toxic agents occurring in the general system as the result of metabolic defect, which are not infected directly or indirectly, but are the invariable producers of degenerated tissue, particularly of the arterial disease mentioned by Dr. Sterne? This distinction has, in a measure, been made for us rather definitely, and so far as I know, irrevocably. Bouchard has chosen the term autointoxication for the processes connected with the intestinal infections and their products, and we can not do otherwise than use the term autointoxication to cover the class of products developed in the intestines as a result of infective processes, independent of the metabolism of the system.

This leaves us to find a distinctive name for the forms of intoxication which occur in the system as the result of vicious metabolism, and, so far as I know, there is no term which has been generally adopted. I have for several years been teaching my classes that the proper term to apply to that class of intoxications which are gastro-intestinal is "metabolic intoxication." That is the safe and separate distinction, although I do not know whether or not it is the proper term.

I simply wish to reiterate that it is of the greatest importance that we, at the very threshold of this subject, draw absolutely well marked distinctions covering these various heights of toxic product. It is true that in the majority of cases the toxic products may merge into both types, but it is equally true that we need not have any embarrassment whatever to separate in our minds the group of symptoms which pertain to one toxic product, and that class of symptoms which are clearly and distinctly related to the other product.

DR. J. O. MALSBURY, of Peru, Ind.—While I regard it as a matter of great importance what we take into the alimentary tract, it is of still greater importance that when once it is there it is kept fluid and moving. We can fully realize this if we bear in mind the conditions resulting from the want of sufficient fluid. Constipation is the result of this lack of fluid in the alimentary tract. We have an illustration of this in the Germans. The German is not particular what he gets into his system, but he keeps it moving, and the fluid in his particular case is beer. In our case there is nothing better than water. Keep the system well flooded with water both inside and out.

As to bottle-fed infants, the great trouble lies in the cow's milk which we give them. I believe that to be the best kind of food, if we have not the mother's milk. It is far ahead of any of the patent preparations now on the market, providing it is properly prepared and properly given. Cow's milk should be diluted with water, and should also contain lime water and a little sugar of milk. In between the feedings give water. You can give it with a nursing-bottle or a spoon, but give water and plenty of it. A little salt added to the water is very beneficial.

After fermentation has taken place in the alimentary tract, there is but one thing to do, and that is to clean it out and keep the tract clean, until we have it in such a condition that it can take care of the most simple food. What to clean the tract with is a matter of individual selection. I usually resort to calomel. After the tract has been thoroughly cleaned, food of any kind must be absolutely withheld. If, in a given case, a child has vomiting and diarrhea, you can not do better than to give a grain of calomel dry on the tongue every half hour, followed by two or three drops of aromatic syrup of rhubarb and castor oil. Then absolutely no food for from twenty-four to forty-eight hours, depending upon the condition of the child. Now, what are the existing conditions? Famishing for food, lack of a stimulant and the want of an astringent. Is there anything that will take the

place of these? I have found a weak infusion of common tea to meet every one of these indications, as it supplies the fluid, a sufficient amount of an astringent, and a stimulant as well. The tea should be made about one-tenth as strong as it ordinarily is, and three or four pints can be taken in the course of twenty-four hours.

As to the absorption of milk, I believe the gentleman struck the key-note when he called attention to this fact. I want to add one more fact to his remark. The common practice is to boil the milk before feeding the infant. This is a gross error, as it destroys the efficiency of the milk. If it be desired to give the milk hot, just let it come to the point of boiling.

The principal and most important point is to keep the alimentary tract clean, and to give plenty of good fresh water.

Dr. Charles L. Minor, Asheville, N. C.—Something said by the last gentleman, and which is not dwelt on by the author, contains a kernel of truth. That is the manner in which our food is shoveled into the stomach, which is thus always overburdened with improperly digested food, overtaxing the liver and resulting in a serious condition. We can not be too careful in having the systems of these patients flushed out sufficiently. I do not know whether the doctor in the balance of his paper objects to the use of water per rectum; if so, I wish to differ with him. These patients need to be washed out; whether it is done by means of colonic lavage or water by mouth is immaterial. Colonic lavage washes out the liver and the kidneys, produces diuresis, and, if the water is sufficiently hot enough, even diaphoresis. You remove the products of imperfect metabolism, relieve the toxemia, which is a part of almost every intestinal trouble which we are called upon to treat in this country.

Therefore, I should be extremely sorry to see the author opposed to the use of water, per rectum or per orem.

Dr. R. E. Haughton, Richmond, Ind.—I have no objection to the nomenclature advanced by Dr. Favill, except at one point. We must remember that we start with a perfectly normal system, then diseases infect it. Cholera, cholera morbus are some of them. One of the first things in the discussion of this question is that we have, first, assimilation, and, secondly, waste. To these conditions we apply the term metabolism. If we overlook this and combine the word metabolism with the word intoxication, we have a condition

which is apt to confuse. The word metabolism is a term applied to the physiological condition of a healthy body.

Coming to the intestinal tract, I have nothing to say as to the methods of treatment for diseased conditions of this tract, mentioned by the various gentlemen, and I heartily indorse all they have said; nay, even more, because they have not gone far enough to cover the entire ground. I do object most strenuously to the term "metabolic autointoxication," as it is too confusing. Metabolism should be confined to its strict meaning. Waste takes place in health as well as during disease, and if applied to a diseased body it should be designated as such.

Another point to be remembered is this: When we come to the question of autointoxication, in which elements are taken into the circulation which intoxicate the system, the nervous system, the circulatory system, etc., the important question to be considered is met by the physician at the bedside. The elimination of these poisons which are effete and destructive is best accomplished by the free use of water. We must remember another fact, that when the child having cholera infantum is burning up with heat, has a high fever and a rapid pulse, it shows that there has been a waste of tissues so rapid that the normal relations of the circulation have been disturbed.

I attended a case of this kind last summer, and the physician who had been there before advised the application of hot water when the child's head was as hot as a hot stove. I applied cold water at once so as to cool this child as much as possible. The increased blood pressure induced by these conditions is the difficulty which must be attended to at this point. What does blood pressure mean? The power of the heart to send the blood into the capillaries. When this power is diminished, insufficient blood pressure results and you see your patient sinking before your very eyes. This is what produces the frightful mortality in this country. We must arrest these conditions or change them, and this is best done by flushing the bowel, determining what your temperature is and how much it varies from what it should be, and then attempt to moderate it. Under normal conditions of blood pressure autointoxication can not take place, but when it does take place the child goes into a condition of extreme debility. Gentlemen, I apprehend some of these conditions at the bedside, but often I feel that I am helpless, because the mother does not want to help me to do what is necessary to save the child from death. I make my suggestions and urge the necessity of following them, and that is all I can do. Often under these circumstances a patient dies, and often a patient is saved.

DR. T. H. STUCKY, of Louisville, Ky.—We have had a very interesting discussion as to the results of intestinal autointoxication, and we have had a most excellent distinction drawn between autointoxication and autoinfection. In fact, the discussion in the main seems to have been along the line of defining these conditions. I am very much in the position of the man who had a wild animal sent to him. He had it, but what was he to do with it? It is immaterial whether or not the condition of uric acid is a secondary or primary one. Taking either position, both seem to be to a certain degree tenable. But if we have a condition of autointoxication, and the symptoms enable us to make a fairly good diagnosis, how are we to manage it?

I wish to take issue with Dr. Barclay, and agree with the previous speaker, as I am a firm believer in colonic lavage. I do not believe that catharsis will eliminate bowel contents, especially when that bowel has been in a state of rest for some time. You may have a diarrhea which is dependent upon constipation. We often meet with cases of diarrhea and cases of constipation, in which one is caused by the other. A retained mass of fecal matter sometimes is tunneled through and this will produce a diarrhea.

To sum it all up, give water internally, externally and eternally, with the exception of at meal times. I believe fluids in large quantities at meals tend to increase the shoveling process. We shovel our food in, and forget at the very outset to instruct our patient that it is essential to have good teeth and perfect mastication so as to insure perfect salivation. I do not wish to take the position that the stomach is a storehouse. Since I have read Haig and Bouchard, I really do not know "where I am at," but I do know, as do all of you, that if food is not properly prepared, the condition of intestinal indigestion will result, bringing on autointoxication, and possibly, as in typhoid fever, a condition of intestinal infection.

Now, if this be true, the condition of intestinal asepsis is what we are after, and by this term we mean the restoration of functions to as near the physiological condition as possible. This is accomplished by elimination only, and the best eliminant we have is from three to five quarts of a good saline solution. Be sure to give plenty of it, and repeat it as often as necessary.

DR. J. T. JELKS, of Hot Springs, Ark.—There is one expression which my friend Dr. Barclay used that I want to take exception to. He spoke of the intoxication present in typhoid fever patients as the result of the micro-organisms

in the intestinal canal. If we accept the fever as being the result of the germs in the intestinal canal, we must resort to a line of treatment which will destroy these germs. For this purpose we have the antiseptic treatment of typhoid fever. I wish to enter a most vigorous protest against this; for, although the germs may start in the intestinal canal, they certainly do not stop there. Early in the history of the case they get into the circulation, entering the liver, spleen, blood current, and getting everywhere throughout the organism. Now, what is the use in trying to fight such an extensive fire with a little dose of an antiseptic? That is my point.

To go further, if the position which I have taken, that the typhoid fever is not the result of autointoxication in the intestinal canal, but of that in the liver, blood, spleen, etc., is the correct one, we must resort to something else than naphthalin, beta-naphthol, salol, etc. The patient may get well under this treatment, but he does it in spite of you and your treatment. There is a line of treatment which is much better than this. It is a line of treatment which throws the patient back upon the phagocytes, and with this means only two or three out of a hundred die. Phagocytosis saves these patients, not the sulpho-carbolate of zinc, it is the white corpuscles that do it. And how will you arrive at this result? By water internally, water externally, and water eternally.

Dr. Fenton B. Turck, Chicago, Ill.—The subject of autointoxication from the intestinal tract is one of the most difficult studies to undertake experimentally. This is especially true when we remember that the toxic substances combine so frequently with the albumens, and that we are as yet unfamiliar with the nature of these albumens. We do not even know the albumen radical. We do not know in what form the toxic substance unites with the various forms of albumen and albumoses. It, therefore, becomes exceedingly difficult to study the toxins and to separate them. The diagnosis of toxemia, due to the overproduction of peptones and triptones, thrown into the general circulation is exceedingly difficult and complicated.

The overproduction of the secondary albumoses forms highly toxemic substances, and which, when thrown into the intestinal tract, can not be further elaborated. From there some of these substances pass into the circulation, attacking the liver cells, which further oxidizes these substances, until the liver becomes insufficient, which is known as hepatic insufficiency, with a resulting cholemia. This is apparently due to a simple intoxication, which in turn is due, as has been so

often said, to intestinal putrefaction. Then, when there is elimination of these products through the kidney, we have renal insufficiency, and the kidney, after a short time, is incapable of further elimination.

So you see that when we speak of intestinal autointoxication, we must not stop and study the toxins which are formed in the stomach and intestines, but we must go further and demonstrate their effect upon the eliminative organs, such as the kidney, liver, etc.

This brings us to another important subject: the effect of these substances upon the vaso-motor centers. As you all know, when we inject peptone into the blood, we have immediately a lower blood pressure, an arterial ischemia. There is hyperemia of the splanchnic area, and a large amount of blood is circulating through the abdominal viscera, a vaso-motor disturbance which further embarrasses the study of autointoxication. We must be exceedingly careful when we attribute everything to autointoxication of the intestinal canal. It is difficult physiologically, chemically and clinically to point out exactly what we mean by the word autointoxication. Some two or three years ago I brought out a work on the toxins which are developed in the stomach. I withdrew the stomach contents, and found that the toxins would be precipitated at various temperatures. I injected these toxins into animals, then developed the bacteria in the laboratory outside of the body, and again injected them into animals in order to study the physiological result. Although these studies were discussed in this country and abroad, and were rather favorably commented upon, I must confess that they are still very incomplete. It is essential for practical purposes that a diagnosis be made of the condition of the stomach, intestines, liver and kidney. Renal insufficiency is such a common occurrence, and we drink so very little water, that we find a lower blood pressure, and because we often fail to appreciate this condition our patients leave us, go to some springs, and return restored to perfect health. The water they drink has increased the blood pressure, increased the activity of the kidney, and through this removed the toxic substances.

We can carefully analyze these cases in our own experience, and make a study of the conditions that exist. The formation of urea in the liver is an index of its activity, and we must, therefore, study this function. The excretion of the kidney can be studied under various conditions, by means of regulated diet or water alone.

In regard to the treatment of the gastro-intestinal tract, that is a subject which requires too much time to go into, but dietetics and the improvement of the circulation and the

musculature of the gastro-intestinal tract, so that we have a better peristaltic action, will do more than all the antiseptics that can be poured or injected into the system. How can we expect to disinfect thirty-five feet of tubing, which is a perfect culture medium, with five or ten grains of an antiseptic? We can render the gastro-intestinal tract relatively aseptic only by increasing its functional activity, and by stimulating peristalsis, for as long as you have peristalsis, bacteria can not grow and develop in or on the walls of the intestine.

When there is atony of the stomach and intestines, you will find that the organisms there present will soon find the culture media, and will multiply rapidly, producing the toxins which are directly responsible for the various functional disturbances.

The study of the condition of the liver, kidney and intestinal tract belongs to general practice and is very important.

DR. BARCLAY (closing the discussion).—I appreciate the discussion, but fear that I have not been correctly understood. Dr. Stucky may not have understood me when I referred to syringes. I referred to the continued use of syringes in the bowel, and I am satisfied that my position is the correct one. The occasional use of syringes, when diseases of the bowel exist, is no doubt useful, and I use them. What I referred to is this, and I emphasize it with all the force of my nature, that the continued use of syringes in the bowel is detrimental to health.

I know many persons who use syringes continually. They inject large quantities of water into the bowel, and retain it over night. Patients have told me that they inject half a gallon of water and retain it, and even have a good night's sleep. This procedure certainly is injurious, and one which will destroy the health of everyone who follows it. My distinguished friend who lives in Chicago said many things which are correct, as did also Dr. Sterne. He probably heard the paper which I read many years ago at a medical meeting at Hot Springs, Arkansas. The title of that paper was "Toxins."

Many distinguished men came to me and wanted to know what I meant by that term, and I tried then and there to define what a toxin was, classifying many of the known toxins. Perhaps I coined the word, as I do not know that the word had ever been used before that, as many of the learned men in the profession seemed to be at a loss to know what I meant. A toxin is anything that will poison the system, no matter where it is generated, whether externally or

internally. There is so much in this subject that I believe it to be impossible for any man to condense it into a twenty-minute paper. It requires volumes and volumes to describe all these changes as far as we understand them. Many of the changes are as yet not thoroughly understood.

Many men are following that subject very carefully now, and perhaps one of the most earnest workers in that line lives in this city.

XLIII. REPORT OF A CASE OF COMPLETE HERNIA OF THE PREGNANT UTERUS.

BY W. V. ANDERSON, M. D.,
TOLEDO, OHIO.

I present this report, ladies and gentlemen of the Mississippi Valley Medical Association, on account of its being a unique one, so far as I have any knowledge.

Our text books on obstetrics make frequent mention of the fact that the abdominal walls may so yield to the pressure of the gravid uterus that the recti muscles will separate, allowing the uterus to carry the attenuated aponeurosis before it, and thus form a hernia, the uterus being the herniated part. But nowhere, so far as I am acquainted, has it been spoken of other than as an inconvenience and source of annoyance or pain to the pregnant woman—interfering with locomotion, etc. No one has, I think, mentioned this condition as a cause of dystocia, and it is on account of this special feature that I present the report of this case to you to-day. Reynolds, in speaking of the relaxation of the abdominal walls, says: "This is most likely to occur in women who have borne several children, and usually only when the confinements have followed each other with considerable rapidity. It gives rise to the malposition known as anteversion of the pregnant uterus, in which the fundus may reach, in extreme cases, a position below the symphysis, or may even rest upon the thighs, this displacement being rendered possible by the distention of the tendinous central raphe and overlying skin

after separation of the recti muscles. It is productive of much fatigue and dragging pain, but may be relieved by the application of a proper binder."

Lusk says: "In extreme cases of pendulous abdomen, the uterus, having separated the recti, descends, covered by fascia and skin, almost or quite to the knees, and seriously interferes with locomotion. Its pressure also produces edema of the abdominal wall, vesical tenesmus, and pain in the distended cutaneous tissues. These symptoms are relieved by reposition of the uterus, and by the application of a suitable abdominal bandage."

It has not, in the experience of these or other gentlemen, seemed to play any part in the mechanism of delivery. You will, therefore, probably be interested in the following case, if not for its practical, at least for its historical, value.

On the evening of March 9, 1894, I was called in consultation by Dr. Arne Zetlitz, of our city, now of Sioux Falls, S. D. I found him in charge of a large, well-developed Polish woman, the mother of ten children. She had been in labor for thirty-six hours under the care of a midwife, before Dr. Zetlitz was called. We found upon examination that the abdominal muscles had been separated to such an extent that the uterus had passed out between the recti, carrying the aponeurosis in front of it, and now hung like a great pear suspended by its cervical attachments, the fundus reaching nearly to the knees. The uterus was freely movable and the os was found to be fully dilated. The uterine contractions were good, considering the length of time the woman had been in labor; but the position of the uterus rendered them ineffective; for at each contraction of the uterus the patient would make vigorous effort to help herself, and though the uterus would rise until its long diameter stood at a right angle to the body, yet contraction and shortening of the abdominal muscles, instead of assisting delivery, acted somewhat as a draw-string at the mouth of a pouch, so that the greater the voluntary effort, the more it interfered with expulsion.

We placed her under chloroform, and after inverting the uterus and having it steadied by an assistant, while Dr. Zetlitz attended to the anesthetic, I applied forceps (the head

presenting O. L. A.) and delivered, without difficulty, a girl weighing seven or eight pounds. The birth canal was ample, and there was absolutely no cause of dystocia but the herniated uterus and consequent prohibitory effect of the contractions of the abdominal muscles. The second day after delivery my friends, Dr. Byron Robinson and Dr. Lucy Waite, of this city, being with us, were invited to see the case. At that time the abdominal muscles were still so relaxed that they lay like rolls at either side of the abdomen, giving it something of the appearance of a shallow bird's nest, with the recti muscles as the rim, and the uterus covered by the loose, flabby integument forming the bottom. The skin was so loose and the muscular rolls so prominent that the fingers could be slipped under them, and the muscles could be easily grasped as one can grasp the lapel of his coat.

The woman made an uneventful recovery, and some three months later she told me that she had had no inconvenience following.

XLIV. THE EVILS, THEIR CAUSES, AND THE REMEDY THAT WILL EDIFY MEDICINE IN AMERICA.

BY A. M. OSNESS, M. D.,
DAYTON, OHIO.

With the evil of an ever growing number and variety of medical schools; with the antagonistic ranks of allopaths, homeopaths, eclectics, physio-medics, plus an abnormal appendix of other pathies and rampant medical charlatanism; with the evil of an overcrowded profession and discriminating state acts against neighboring practitioners; with an agitation for a higher standard of proficiency for candidates for the degree in medicine, in contrast with the conspicuous lack of scientific spirit among promoters and the low standard of efficiency of medical teachers at large; with the evil of servility of the profession to various religious orders, who dis-

pense medical services in institutions under their auspices, orders that thrive at the expense of the physician's colleagues; with the evil of undue ostentation—thus catering to the popular notion that medical men can manage on wind and glory; with a crowning of these evils by a complementary dignity, pertinently characterized by a New York journal as "dignified starvation" for two-thirds of the medical profession, we will admit the fact that there is something radically wrong with our profession. Wherein are the causes? We observe that the vast majority of the medical profession is recruited from the ambitious middle class of society.

True, primarily, as followers of Æsculapius, they may have been imbued with the noble thought of gaining for themselves but a respectful recognition in their respective communities, but after spending their individual accumulation in pursuit of study, and with the lapse of years in self-denial, and even when possessing a proper degree of learning and skill, they are still obliged to realize that there are even other insurmountable social requisites, such as influence and riches, serving as stepping-stones to the realization of the poor acme of their aspirations—they wake from their optimistic lethargy.

Even they who, perchance, have already gained that enviable social position, find it necessary to fertilize the same with the "filthy lucre," and the veneer of prosperity and assumed contentment is often only ostentation deep, while burdensome in expense, since the conditions are in no way ephemeral.

Therefore, on finding themselves in the lurch, placed there by a self-fostered altruism and by a whimsical demeriting society, the more enterprising ones, with the human egoism kindled, seek to advance their personal interest by imposition upon a credulous people.

Some seek moorings under auspices of the church, with its dispensaries; some merge into ethical egotists and buy chairs in medical schools, or found them, if necessary Again, others more shamelessly resort to quacking self-laudations. The above phases of redress emanate from one common cause—paltry remuneration for long hours of professional

toil—yes, from the need of ampler remuneration; not so much in higher fees as in more general charges and cash collections. Need I quote speculative statistics in support of my assertion? No; I refer you but to your own individual economic status for confirmation.

The other cause is the prevalent seeking for profitless notoriety. Do not in advance repudiate my assertions, for our present social environments refute it, our fraternal jealousies deny it.

However laudable and commendable our intentions may be at our initiation, we are soon brought by force of circumstances to realize that there is also an economic phase to our professional existence, and for the sake of those depending upon us, as well as for the practical side of the issue, our intended altruism grades down with a material certainty.

We witness the manufacturer oiling, repairing and caring for his machinery, but what moral obligations does he admit to the sickened employe, who jeopardizes his life in daily increase of the latter's wealth? There is the merchant speculating in the very staff of life, cornering the very necessaries of existence, compelling tribute from the fellow in the cradle to his ending with the grave. What moral obligations enter his dealings with his victims?

The real estate parasite and landlord, what consideration has he for the disabled tenant? Even the clergy, in self-sustenance, are levying upon the living and the dead. With all of them the law of self-preservation is paramount and charity compensatory for all shortcomings. Yes, to rob you of your all and remit in sardonic kindness to you the infinitesimal of it is charity. Charity at best is a great social crime. It makes paupers of the indigent, humiliates the respectful and degrades the ambitious.

Pray don't infer from the above that we should refuse our services to the needy sick; on the contrary, let us serve the worthy sick gratuitously in a sense of duty, of social obligations—not in charity; for then can we demand protection for our interests, ask not for favors, but for rights.

The merchant, the manufacturer, the preacher and their families must live, and they demand pay for their services, as

a rule in inverse ratio of the good done. Why then must the medical man give his services free, even to municipalities that can afford to pay and do pay well the unskilled politician who takes upon himself the dispensation of municipal bounties?

On a sober reflection we are cognizant of the harm we are inflicting upon the profession, certainly for the seeking of the profitless notoriety. Again, consider the millions spent annually in nostrums and compare with the insignificant sum spent for prescriptions, and you will appreciate how love's labor is lost, how gratuitous services are undervalued, how the motive is misconstrued.

The people are content only with what they pay for. I do not deal here with the comparatively few specialists or the few peers who have the mother-wit to ask good pay for their dexterity. It is of the plurality of the general practitioner that I am speaking. We have two prominent interdependent causes for the evils that beset our avocation, and that make us poor indeed.

They are profitless notoriety that we can not conscientiously pride in, and insufficient pay for services rendered, that does not raise us in the estimation of a mercenary world.

To remedy matters we seek to make a virtue out of a necessity by agitating for a higher qualification of the practitioner, perhaps intended also as an initiative relief measure for the congested ranks with their relentless competition. Alas, as much as a higher education is commendable and desirable, it is not an indispensable measure for the elevation of the profession.

Though the average European physician ranks in classical and theoretical knowledge above the average American practitioner, as practical men the Americans are head and shoulders above the Europeans.

Apropos, I will quote an incident in General Butler's professional career that bears upon the point: During a jurisprudence examination by the general, one of the candidates failed to answer any of the practical questions. The general, desirous of encouraging the man, asked him what he would like to be examined upon. The candidate replied that he was well up in "statutory law." "But," said the general,

"there is nothing to prevent a fool of a legislature at any time from changing all the statutory law you know." So it is with theories that are phases of evolution of an ultimate truth, therefore empirical in their application, while practical knowledge is capable of immediate utilization and productive of immediate good. The measure for higher qualifications serves to instill a feeling of distrust among the profession at large, and instead of gaining their co-operation we find their interests alienated from the common and themselves bigoted adversaries.

What initiative measures then will bring unity and confidence to our fraternity?

I say in answer, any legislative measure that will circumscribe and dwarf the growth of "mushroom medical schools"; any measure that will raise the standard of the medical teachers and decrease their material advantages in granting diplomas. Remember that a scientific spirit and a mercenary one are incompatible. Therefore let meriting scientists occupy the chairs in colleges with the sole aim of gaining for themselves the highest pinnacle of veneration by the profession — not commercialism; and we inferiors by emulation unconsciously will elevate ourselves. But can such steps be taken? Yes, if we legislate and are passing upon the qualifications of the general practitioner, why not be able to pass upon those who take it upon themselves to grant to others the right to practice?

Legislate that a medical teacher must give his entire time to the college and its clinics and cannot engage in private practice, and shall look for compensation for his services to the students' fee, college and hospital clinic revenues, grants, etc., and you not only undermine the pathies, decrease the number of schools and graduates, but weed out the speculators and unripened teachers. You raise the teachers and students in their mutual estimation. Yes, you raise the spirit of science, you inaugurate a better era for medicine. Next we can deal with the other ramification of degeneracy, namely: the unprofessional advertising physician. How prevent his fetation?

(1) By obligatory interneship in some clinic or hospital for a period, before his launching upon an independent practice.

(2) Conditioning granted diplomas, revocable by the school for unprofessional practices by the possessor of it.

The first measure will satisfy the restless spirit of a new medico, who fears to be overlooked by an unsympathetic world; and conscious of his inexperience otherwise, offers his service gratis, and at his future expense. The second measure, with a complementary law, that no one shall practice without a medical diploma, will evolve the great principle of "benevolent assimilation," for they may be good if they will, they must if they want, etc. Another measure, no less important, is that we must divorce our professional interests from the material interests of the professional charities, even as the clergy divorced itself from medicine, when the latter became scientific and less affiliated with superstition, therefore less remunerative.

Why permit the laymen to dispense our services at their institutions, often depriving ourselves of legitimate revenue; inasmuch as with such hospital institutions under the charge of medical men, the work will be done quite as effectively and with less material harm to the local practitioner?

As charitable institutions, though crowded with the dependent indigent and the shiftless, they are not even given in charge of the minor lights of the local profession to whose care, however, we intrust the health and welfare of the better and more desirable members of the community. As educational institutions supported by those who fall under the care of the less skillful, these institutions should be at the disposal of the latter in acquiring skill. Such at least would be the case if we did not seek to enter the arena with favors and undue advantages instead of upon our merits.

The solicitude with which our professional fellows cater to these professional charity hospitals and clinics warns us of the subcurrent effort to advance one's interests at the expense of the less fortunate.

Lastly: even the druggist permits himself openly to prey upon the physician's legitimate income. I sincerely recommend that we encourage strictly prescription pharmacists, who will not refill our prescriptions indefinitely, or laud nostrums as sure cures, or resort to other tricks of trade, harmful to the practitioner.

From the above we learn that the evils are:

1. A countless variety of mushroom schools. 2. Antagonistic pathies. 3. Overcrowding of the ranks. 4. Lack of scientific spirit among medical teachers. 5. Undue ostentation. 6. Unscrupulous intrigues among the profession.

The causes of these evils are:

1. The fallacy of profitless notoriety. 2. Paltry remuneration for professional services.

The remedy lies in:

1. The regulation of schools and their professorships. 2. Obligatory interneship for all graduates. 3. Conditioning diplomas, revocable for unprofessional conduct. 4. Charity hospitals being under direct supervision of medical men. 5. Encouraging strictly prescription pharmacies.

DISCUSSION.

Dr. William F. Barclay, of Pittsburg, Pa.—If I correctly understood the essayist, there was some disposition to disparage the profession in this country as compared with that of other countries. I do not know what the experience of others has been, but my own experience teaches me that the essayist is probably mistaken. I am firmly convinced that American physicians, especially those in the larger cities, compare very favorably with physicians who have been educated in some foreign country. I have discussed this matter both with physicians from abroad, and those who have gone abroad from this country to continue their medical study, and they have informed me that our better schools and colleges are equal to those of foreign countries, and even superior to some. Within a few squares of me there are located two physicians who came here from abroad, men who have been educated in the schools of their country, and the impression which I have gained of these men is a contradiction of the statement of the essayist. We, of course, have the advantage over a foreigner, as we understand our own language perfectly, but after careful study of these men, it seems to me that there is a general disposition to disparage the American physician. Within perhaps eight or ten blocks from my office, in Pittsburg, there are quite a number of physicians who have come from foreign countries, and some of them have made unwarranted assertions about American physicians and universities, to the effect that they know little or nothing. Being an American, statements of

that kind are naturally unpleasant to me, and I do not appreciate nor enjoy them; furthermore, I think they are in bad grace.

I appreciate much that the essayist has said with reference to methods adopted by physicians to obtain a lucrative practice and a livelihood. I appreciate the fact that there is much in the practice of every physician which is more or less unpleasant, and which we would like to get rid of.

Charity, as he says, is certainly overdone, and it is exceedingly difficult to know just where charity ends and where imposition begins. I have found it difficult to determine just where to extend charity in many instances, and I am positive that that is the experience of almost every practitioner in this country.

The reference to the druggist is a point well taken, as most pharmacists acquire the disposition to dispense medicines without prescriptions, and to recommend proprietary and patented preparations. I believe that imposition has largely been killed by the placing of these proprietary medicines in large general stores, which sell them at reduced rates. That has so lessened the profits that, as a consequence, fewer of these preparations are now sold than there were a few years ago. The question as to how to remedy these evils is a rather difficult one to solve. Most states have passed medical laws. It is a very difficult thing for a chief magistrate of a state to appoint a board of medical commissioners to pass on applicants desiring to practice.

A purse of $1,000 was contributed in Pennsylvania by a number of applicants, and that money was expended in getting a proof of the questions from the printer's hands, so that each man had a copy of all the questions, giving him ample time to prepare for the examination. When medical schools were permitted to examine and grant licenses to practice, the weaker schools were most applied to by prospective medical students.

This question is so immense that we would consume entirely too much time in endeavoring to arrive at a definite conclusion at the present time for remedying all these evils.

DR. JOHN PUNTON, Kansas City, Mo.—The evils in the profession are so numerous that we can not help but be aware of their existence, but the remedy lies very largely with the members of the medical profession. Even though we do not like to, it becomes imperative for us to enter the field of politics. Many evils will be remedied when we have once realized this fact, and when we are willing to go to the legislature and there demand the rights which belong to us

as a profession. What we need is a cabinet officer, one who will represent the profession at the head of this government, and it lies with us to place him there.

DR. C. M. SKINNER, Hartland, Wis.—As the pharmaceutical profession does not seem to be well represented here to-day, I, having been a pharmacist before I begun the study of medicine, feel it my duty to say a few words in their behalf. It at that time came to my knowledge that over 60 per cent. of the practitioners in the vicinity in which I was located at that time used their own medicines, some even dispensed hot water bottles, syringes, braces, etc. The pharmacist quite naturally retaliated by counter prescribing.

There is hardly a house represented in the medical exhibit here to-day whose representative does not see every practitioner in this country. These men urge physicians to use their own remedies, and in most physicians' offices you find elaborate displays of various tablets, etc. That is one reason why pharmacists carry on counter prescribing.

XLV. DO WE NEED TO THINK?

BY WM. O'NEAL MENDENHALL,
RICHMOND, IND.

We are a common body. We are alike human, but we are not human alike. We are alike physicians, but not physicians alike. To please each member of this body, to edify each physician, has been a deep study to me. These papers, with their following discussions, constitute the food of this body. Every member of the body must be well fed, well nourished, that the body be strong, active and healthy.

I am proud of this nation, for I believe it is the grandest nation upon the earth. I am proud of my state, for it is my native state. More than half a century ago her April sun shone down upon my infant form, warming and vivifying it for manhood. Her influences and her educational advantages have made me what I am. I am proud of her physicians, for they are my honest, earnest brothers in the profession. I am proud of this city, for in it the honors of a physician were conferred upon me. I am proud of this

society, and gladly would I have it the peer of any in the states, to do which, every man must edify and every man be edified. Then we will stand a prominent pillar in the work of these states, a tried stone in the building of the nation, a moving element in the science of the world. We are alike interested, but we are not all interested alike. Some are deep in the mysteries of digestion; some earnest to know of assimilation; materia medica taxing the ability of some, therapeutics the noblest efforts of others; physiology a favorite field, and anatomy the vantage ground; many fly to surgery as their first love, while results form the haven for all.

With these remarks as a preliminary, I desire to report the condition of a young man who came under my care for treatment, to do which will lead us into the field of physiology—to deal with the finer anatomical structures—will open a field for thought as to the physiology of digestion; materia medica will have to be called upon for a remedy, and therapeutics for its selection.

In making an inquiry as to the family history of this young man, I find the father has always been a stout, healthy man; the mother also healthy until about twenty years of age, at which time she received a very severe fall upon the ice, which seemed to her to have broken the coccyx, producing the most excruciating pain. By the next day she was very stiff, especially the lower limbs.

A physician was called, who seemed to see but little in the case. Gave her a dose of pills to act upon her bowels, which action seemed to continue for many months, and could not be checked, or even affected, by any medicine, but finally recovered; but during an attack of typhoid fever the bowel trouble returned as violently and unyieldingly as before, but after months of the most stubborn resistance to all medical skill, seemed again to recover; but all through these forty years, when any unusual trouble or excitement came upon her, the most uncontrollable diarrhea would manifest itself.

After marrying she gave birth to five healthy children, but the sixth, a daughter, who is now grown, has always been troubled with the most obstinate constipation.

While carrying the seventh child, which is the subject of this paper, the mother was again troubled worse than at any other time of her life with this looseness of her bowels, which continued months after her confinement. When this child was born he seemed to be all right, except a slight tendency to constipation, which always responded readily to a soap suppository.

After a few months he became affected with incontinence of feces, which continued, though under the care of some physician all the time. Both he and his mother join in saying that he never took a medicine that would control his bowels in the least. Though he gave attention to his bowels from ten to twenty or more times every twenty-four hours, his linen was always soiled, and on retiring he was padded as best they could, slipped into a sack with a draw-string around both neck and feet, and in the morning he would be stained from head to foot, and both he and the clothing would have to be washed. From his infancy he was affected with peculiar nervous paroxysms, which, as he grew old enough to explain, were found to be paroxysms in which he was neither able to move or speak, and he always desired to get hold of something, and while nervously clutching it, a scarlet flush would come to his face. These were also accompanied with a strong desire to evacuate the bowels, which desire would cease as this nervous paroxysm passed away. Up to the time when he came under my care, he never retired with the hope of being able to pass the night without being up from six to ten times, and many times would not be able to get from the bed until his bowels would move. Such was his condition when he came to my office for treatment.

His history made a deep impression upon my mind, and I did not dare to prescribe without giving it a very careful thought—without knowing the case.

There are three complete systems which must be carefully examined, alimentary, absorbent, assimilative, each comprising the whole man and bringing into action nearly five hundred distinct organs, some of which must be at fault.

It will not do for me to say his bowels are moving too freely and that makes diarrhea; that they have been moving

too freely for years, and that makes chronic diarrhea; that Wood and Flint and Niemeyer would recommend such a treatment, for they have never seen this patient; yea, more, they may never have seen such a case. The alimentary, intestinal, or crude digestive section, including mouth, teeth, esophagus, stomach, duodenum, liver, intestines, small and large, are to receive, masticate, digest, liquefy, and unify crude matters—vegetable, mineral, solid, viscid, liquid—reducing all to an even paste. This may be called the feeding system, the earthly part of man, the reservoir system. I find there is no trouble in his ability to receive, to masticate or to digest, so far as to liquefy and unify these crude materials, but when that point is reached the work seems to stop, and this unified mass passes away. Next, in order that the examination be complete, we must inquire into the action of the lymphatic and lacteal organs, the absorbent system, which consists of countless myriads of little villi, fastened upon the intestines and strown at intervals with certain nodosites or glands. These absorbent vessels are not limited to the digestive tract, but send their rootlets, in the form of lymphatic lacunæ, through nearly all the tissues except brain and bone. Lymph and chyle, the white blood, are of the same composition; serum, white corpuscle; fibrin, fatty globules.

When entering the great trunks of the system this white blood passes from a soluble food, or pasty chyme, to liquid food, chyle, or milk, which by passing through the nodosites, or lymphatic glands, becomes vitalized milk or lymph; that is to say, it acquires the white blood corpuscles, which are formed and living elements.

In normal states the grand supply of this white blood, or chyle, is from the intestine through the villi, or rootlets, and through the thoracic duct. In case this intestinal supply fails the lacunal and reticular vessels begin a more serious work, drinking up the tissues of the body, which does not obtain in this young man's case, for he is fairly well developed; not quite so large as the average young man at his age, but showing a degree of nourishment sufficient to warrant the conclusion that the assimilative system must be doing its work well to sustain the body in so good a condi-

tion, when so large a quantity of what was taken into the alimentary canal passed so hurriedly away.

Through this method of reasoning I decide that the assimilative system is not at fault.

But there is a failure some place between the taking of the food and its final destination in the flesh, and the failure must be found. The food as it leaves the mouth is moistened and masticated, it is still crude food. As it leaves the stomach, peptonized, it is soluble food. So far I have been able to find no fault in the digestive process. As it is absorbed by the villi, having been emulsified by mixture with bile and pancreatic juice, it is liquid food. Here I think I find the trouble; not in the failure of the action of the liver or the pancreas, for the food seems to be properly liquefied and unified, so that what food passes the lymphatic glands becomes properly vitalized food, ready to pass into the veins, and through the portal system, where it becomes crude blood plasma, and through the lungs, becoming purified blood plasma. So that I conclude this part of the work is well done also.

The food he eats is liquefied and unified, then passes away, and I conclude there is a weakened condition of the cœliac plexus, and through this nervous weakness a lack of tonicity, with defective muscular power in the bowels, rendering them incapable of retaining their contents until these weakened absorbing villi shall have completed their work.

This is not identical with the cœliac flux, which is a species of diarrhea in which the food is discharged by the bowels in an undigested condition, by some defined to be diarrhea attended with discharges of chyle or chyme, and generally symptomatic of tubercular disease of the mesenteric glands.

The cœliac or solar plexus, or plexus mesenterii proprius et maximus, is formed of numerous nervous filaments which proceed from the semilunar ganglia of the great sympathetic. It is strengthened by several branches of the right and left pneumogastric nerves, is seated around the trunk of the cœliac artery, behind the stomach, and furnishes the secondary plexus, the diaphragmatic, coronary of the stomach, splenic and hepatic, which accompany the arteries of the same name.

What can be done? Sixteen years of constant effort say nothing. Some old and earnest in the profession have advised me to just trust him to the Lord.

But something must be done, and I am asked to do it. This young man was in a critical condition; his system was beginning to fail under this load of disease. He has become thoroughly discouraged, but at the earnest solicitation of his mother he says: "I will try just this one time more, and if this treatment fails I will try no more, but quietly await my time and die, as the only hope of being freed from this unsatisfactory, this disgusting, life."

The cœliac ganglion is at fault, weakened by an hereditary transmission. There is a lack of tonicity, a dilated condition of the efferent vessels. The circular muscles of the coats of the bowels are relaxed and weakened through an insufficient nerve supply. My treatment is strychnia and ergot. The strychnia given after this formula:

℞. Strychnia Crystals..... grs. xvi.
Acetic Acid, dilute.....dr. iv.
Tr. Cardamomi, comp.....dr. i.
Alcohol.....oz. iv.
Water to make.....oz. xvi.

Mix. Sig.: Fifteen drops, with an equal amount of fluid extract of ergot, after each meal.

Just before retiring I had him thoroughly cleanse the lower bowel with a hot decoction of hydrastis canadensis; the strychnia as a nerve tonic; the ergot to give tone to the circular muscles; the heat, a stimulant to the bowels; the hydrastis as a tonic and healing agent to any catarrhal or ulcerated condition that might be present, and the water as a vehicle and cleansing agent.

The result, after four months of treatment: When he is careful of his diet he has but one action from his bowels every twenty-four hours, and that at the time of the injection of the hydrastis. But when he yields to his appetite and loads his stomach with indigestible food his bowels move from two to three times in the twenty-four hours. After six months of treatment the hydrastis was discontinued,

and he says if he would guard his diet and care for his treatment as directed he would almost never have more than one action per day. But he is a boy and has a boy's appetite, and it will occasionally crowd him beyond the line of his better judgment and of prudence, and these unpleasant results follow.

Eight years have now passed since he had any treatment, and he is well, and is holding a position in this city, Chicago. He says the disgusting feature of life is gone, that its clouds have cleared away, that he can and does have the fullest appreciation of its sunshine.

XLVI. RECENT PHYSIO-CHEMIC RESEARCHES AS TO THE PHYSIOLOGIC ACTION OF LECITHIN AND OTHER ORGANIC PHOSPHOROUS COMPOUNDS.

BY L. H. WARNER, M. D.,
BROOKLYN, N. Y.

Ever increasing facilities for research, modern improved instruments and apparatus, continued researches and experiments have enabled us to get a deeper insight into organic chemistry. But a few years ago, and we only knew of six organic elements. Since then we have learned to extract organic elements in their natural form and to produce them by pure chemical agencies. To-day a new meaning is attached to the term, organic chemistry. The field of investigation is enlarging daily, the scientific branches of medicine; physiology, chemistry, electricity, pathology and bacteriology have become more closely allied. Each one of these branches has given us additional knowledge, and to-day we no longer regard them as infants, as of old, but each one separately as a young, active giant. Our scientists have supplied the wherewith to fight the most obdurate diseases. The physiologist of to-day deals with vital phenomena, he experiments

upon the living bodies of animals, and there meets organized structures that can not be reproduced in a chemical laboratory. He has enriched our knowledge of cell life. Electricity has furnished us the cautery and X-ray.

Pathology has advanced until to-day we begin to understand the value of blood examinations for diagnostic purposes, and bacteriology has brought to us a most effective agent in antitoxins. To make futher advances in the science of medicine, we need the coalescence of the previously mentioned branches of medicine. With all the advances made in the few years past, we have not been taught anything new regarding lecithin, an element occurring in all animal and vegetable cell life. In 1864 Goblet stated that lecithin was the chief phosphorized constituent of food and that it was split into choline acid and glycerophosphoric acid during digestion. Its symbol is given as $C_{44}H_{90}NPO_9$. In the brain it occurs as protagon; in the nerves, blood, tissues and other organs in the free state or in combination lecithin and a related product, sarcolactic acid (Fleischsäure), also known as phosphocarnic acid ($C_{10}H_{15}N_3O_5$), can be easily obtained from any organ of the human body. If brain, muscle, bone or other tissue be minced up and treated with aqua calcis we will receive a precipitate of calcium phosphate. Add to the liquid first, next to the precipitate, ether and alcohol in equal proportion, allow it to evaporate, again add ether of specific gravity 1,725 and allow it to evaporate, and we obtain a crystalline, wax-like sediment, soluble in ether and alcohol, but which swells up in water. This sediment is lecithin. Its existence or non-existence in food, and its physiological action, I studied while experimenting upon living animals. Our text-books say nothing regarding the synthesis of lecithin in the body or regarding its physiological importance. Bokay, Goblet, Liebreich and other scientists claim that lecithin is a tissue-building substance, and that it forms a constant part of nourishment; that it is a food for the nervous system, and without it the manifestation of nerve force is impossible. They also claim that it is found in all cells and tissues of the body. It is an organic phosphorous compound and its function in the living organism is that of growth, reproduction and all vital processes known

as life. If administered by subcutaneous injection it promotes cell and tissue growth, as may be seen by the following data. Three rabbits are experimented upon. Each weighs 413 gm. Hemoglobin 73 per cent., 73 per cent. and 74 per cent. Red cells, 3,500,000; white cells, 4,000. Urine of acid reaction, traces of phosphates; feces contain traces of phosphates. All three appear lively; No. 1 is fed on vegetables; No. 2 on vegetable food chemically treated to deprive it of all phosphates; No. 3 on same food as No. 2 plus one drachm, 10 per cent. lecithin solution every four hours. This process was continued for five days, when rabbit No. 2 was very weak, unable to walk, crawls; appears sick. No. 1 weighs 414½ gm., No. 2 weighs 407 gm., No. 3 weighs 416 gm. Blood of No. 1 rabbit has not changed since first day; of No. 2 hemoglobin reduced 23 per cent.; red cells diminished 750,000; white cells increased 9,000. No. 3 shows increase in hemoglobin and red cells; white cells normal. These few tests are clear corroborations of the statements of Liebreich, Bokay and others.

Living matter is a physio-chemical combination of organic elements which sustain life and promote growth; remove one of the elements and death follows. All these elements undergo chemical changes within the organism, resulting in physical activities, the motions characteristic of life and growth. In animal life reproduction consists in the fusion of the male and female germ cell, fusion of nuclei follows, and continual asexual cell division and growth into a new individual results. Thus lecithin, being a cellular constituent, is a factor in reproduction. During the reproducing process the segmented ovum absorbs nutriment from its surrounding maternal tissues, and later through the mediation of the placenta. About the seventh week the embryo assumes distinctly human characteristics. Profound physiological changes occur at birth, as organic connections with the mother cease, and two factors become responsible for the character and actions of the living organism—heredity and environment. The former comprises actual or potential characteristics transmitted by parent to offspring; the latter comprises material and immaterial components, such as food, water and air, and nature's forces, light, heat, etc.,

which are acting as stimulus upon action. It is not my intent to go further into the factor of heredity aside from calling attention to the part heredity may play in the nursing of infants. There is not alone the danger of a probably infected mother nursing her offspring, but also the want of sufficient organic substances in mother's milk, which may and do play an important factor in the acceleration of cell and tissue growth of the infant. We are in want of physiological facts regarding mother's milk. We know that milk is the result of the activity of certain of the protoplasmic cells occurring in the epithelium of the mammary gland; we know that the latter abstracts from the blood very nearly the amount of salts found in the tissues; we also know that the fat is formed in the cell through a metabolic action of the protoplasm, and we can microscopically demonstrate that fat is gathered in the epithelial cells, but we are lacking data worked out by physio-chemic research. Physicians are rarely consulted regarding the food of a pregnant woman, the latter often being guided by the cravings of her appetite and the force of custom in eating. The problem of digestion is to render albumen, sugar, starches, fat, and organic and inorganic substances soluble in the gastric and intestinal fluids, and hence a review of the physiology of food becomes a necessity when considering as to what should be the proper food for mother, infant or patient. Regarding the difference between mother's and cow's milk, we learn from Leed's analysis that cow's has feebly acid reaction, mother's milk alkaline reaction. Let me remark right here that lecithin can not occur in acid media. Human milk contains more fat, more lactose, but less albuminoids and inorganic salts than cow's milk. The combination of the various elements of the mammary gland of woman makes the resulting product characteristic of mother's milk. Trials have been made to humanize milk by lessening the casein and increasing the sugar and fat of cow's milk. Organic phosphates, lecithin and phosphocarnic acid, the study of which has been so much neglected, are the important factors in human milk. Obtain some human milk, allow it to stand, remove the casein and albuminous bodies by filtration and treat the filtrate with barium hydrate, and a precipitation of

barium phosphate will take place. In the filtrate of this sediment we obtain, after removal of probable excessive barium oxyhydrate through carbonic acid by means of ferrum chloride in heat at 60° and more, a flaky residue, a salt of a nitrogenous acid, the phosphocarnic acid. The albumen treated by chemical process gives us the lecithin. Phosphocarnic acid is largely found in vegetable life, and to it is attributed a great function in life process, especially during germination and blossoming. Lecithin is split into fatty acids, glycerophosphoric acid and cholin in the intestines. Bokay claims that it is split into fatty acid by the fatty dividing ferment of the pancreas, that it is entirely absorbed, as he found no traces of it in the feces, and no increase of phosphates in the urine occurred.

I operated upon the rabbits previously spoken of, produced in them duodenal, biliary and intestinal fistulæ, drew off the different fluids, and the results I obtained verify Bokay's statements. Physiological chemists and physicians agree that phosphorized organic substances are essential to the healthy maintenance of life, as they are an element in every solid and fluid of the body, in the nerve centers, and they are the source of nerve power. Dusart has demonstrated that phosphorized organic substances are exciting agents of the functions of nutrition, inducing the albuminoid matter to assume the cellular shape, and to determine the formation of a healthy blood corpuscle. The analysis of blood brings us face to face with lecithin, and with it the fact that the human organism finds it as a constant constituent of its food, from the time of conception till death.

It is necessary that we become better acquainted with an element of such intrinsic value. It is called upon to aid in furthering the growth of the newborn infant, to build up its blood and tissue. I have previously shown that it is a constituent of mother's milk, but at times mother's milk does not contain sufficient organic phosphorous substance to fulfill the wants of the infant, and in such instances rachitis, mostly attributed as due to the use of artificial infants' foods, will result. If such were the case in all instances, then we would also have to condemn sterilized milk. The latter is not so easily digested. If sterilized too long it will convert the

lactose into caramel. Sterilization lessens the antiscorbutic power of milk for young infants, the amyloptic ferment is destroyed, the casein coagulates less readily by rennin, the digestibility of casein by the gastric and pancreatic juice is retarded, fat is not so promptly absorbed, and milk sugar is destroyed. Infant foods, as a rule, contain too much sugar and insufficient fat, or too much starch, in which event the saliva and pancreatic secretions are unable, at least during infancy, to digest same.

The ever present lecithin and phosphocarnic acid in all milk and all food led me to a series of experiments giving me the following results. Of forty specimens of human milk analyzed and microscopically examined, only eight gave equal results on three consecutive daily examinations, but all specimens contained lecithin and phosphocarnic acid. Of twelve specimens of cow's milk obtained from same animals for seven consecutive days but two gave equal daily results, but all contained lecithin and phosphocarnic acid, but less than any specimen of human milk. Of twelve artificial infant foods but one contained lecithin and phosphocarnic acid. One class of animals was fed on mother's milk, one class on cow's milk. For my experiments I selected a number of young cats, rabbits and guinea pigs, each class of animals from the same litter. Six animals of each species were used for these tests, and were divided into two classes of two rabbits and two guinea pigs each. No. 1 class were allowed to feed on their mother's milk. No. 2 class were fed on cow's milk. On this diet the animals were kept for two weeks, during which time they appeared lively and playful. Blood, urine and fecal excretions were daily examined. At the expiration of two weeks the animals were weighed, and I find gain $\frac{7}{11}$ gm. in animals of class one, gain of $\frac{5}{11}$ gm. in animals of class two. Physically, the animals of both classes appear equally well developed. One animal of both species and class is killed and dissected, giving the following data: Organs of both classes are well developed, the brain appears normal, cerebral hemispheres, the basal ganglia, the pons cerebellum and medulla are firm and developed, color reddish gray, blood is non-pathological. The intestinal fluid is drawn off by pipette and tested for organic phosphorous substance.

On account of the acidity of the intestinal fluid, the organic phosphorous compound appears as a split product in the form of glycerophosphoric acid. The bile was collected in separate tubes, and subjected to Gmelin's test and subsequent chemical analysis for organic phosphates, which were found in bile of animals of class 1, traces only in bile from class 2; or, in other words, a reserve supply of organic phosphorous substance is found in the bile of animals fed on their mother's milk, but only traces in bile of No. 2 animal. Microscopic sections of the duodenum from animals show the intestinal tissue of animals of class 1 to be filled with a granulation, which, upon analysis, proves to contain organic phosphates. It is claimed by Langly that these granules aid in the making of gastric enzymes during the act of secretion. The bones of animals of both classes appear well developed and strong. The calcareous deposit around the cartilage cells was somewhat lacking in No. 2 animal, from which we may deduct that the animals derived insufficient nourishment from cow's milk. We have thus facts to bear out that the organic phosphorous substances are bone and other tissue builders; they enrich the hemoglobin of the blood; they play an important part in the metamorphosis of the animal tissues, especially in the formation of subsequent changes in animal cells. They are the exciting part in the function of nutrition, they induce the albuminoid matter to assume a cellular shape and to control the formation of tissue. As long as food contains a sufficiency of lecithin, phosphocarnic acid and other organic phosphorous substances, we will not detect any pathologic conditions in the fluids and tissues of the organism, but will observe health, growth and strength. Thus in the treatment of diseases, especially wasting diseases, organic phosphates become important factors. As long as we have been unable to reproduce mother's milk by synthetical methods, we must be satisfied with a food containing as near as possible the amount of organic phosphorous substances, lecithin and phosphocarnic acid as is contained in the former. But the amount of same varies often in both mother's and cow's milk. Although my experiments with lecithin, as reported herein, have only given us a closer insight into the physio-chemical combination of milk and milk pro-

ducts, and we have obtained some data as to its physiological action upon cell and tissue growth, there still remains a large field for investigation.

XLVII. DIABETES AND ITS CONSTITUTIONAL TREATMENT.

BY ELMORE S. PETTYJOHN, M. D.,
ALMA, MICH.

The increasing number of cases of this disease in comparison with other diseases leads us to a further consideration of its cause and treatment. It occurs in young children, in men and in women from twenty to sixty years of age; in the Hebrew race more frequently, probably on account of their irregular and high living; in the negro race less frequently, because of their simple, plainer living; in the American Indian not at all so far as is known; in youth it is more frequent in girls, in adults in men. Heredity has a bearing on the cause in a neurotic inheritance as a general constitutional consideration. More than half the cases of this disease die within two years of the onset, regardless of our best treatment. Yet patients have lived twenty years with a glycosuria.

The disease is less frequent in those who do physical labor, no doubt on account of the elimination produced by exercise. It is found most frequently in intellectual workers and those of sedentary habits, professional people furnishing from 7 to 10 per cent. of all the cases. In laborers and mechanics and housewives the urinalysis of 672 cases showed absence of sugar in every instance.

All authorities agree that diabetes is a peculiar pathological state of the body, the result of some disease or irritation of the nervous system and blood vessels, or the loss of the functional powers of the pancreas and liver, which produces great weakness, prostration, and in young people early death.

Granting that the blood in diabetic patients has less glycolytic action than in health, according to the study of Lepine and others, this does not *prove* the presence in health of a special glycolitic ferment produced by the pancreas, the *lack* of which permits accumulation of sugar in the blood.

Pathological investigation finds the pancreas diseased in only a small portion of the cases, but no more frequently than the arteries, the liver and the kidneys. In enlarged pancreas, as is found quite frequently in malarial districts, especially in the South, both temporary, acute and chronic enlargement of the pancreas is found. In the study and observation of 125 cases of enlarged pancreas during the past five years, no case of diabetes has been found. In the literature of this subject and the study of experimental pathology the relation of malarial enlarged pancreas to diabetes is unmentioned.

Pancreatitis occurs with enlargement, pancreatic hemorrhage in fat people, or in cases of arteriosclerosis fat necrosis of the pancreas. Abscess of the pancreas, pancreatic concretions accompanied by colic and distinguished from intestinal calculi by examination of the stools and urine; atrophy of the pancreas, cysts from stasis; carcinoma of the pancreas, primary or secondary, *have* all occurred frequently, thus inhibiting the physiological function of this gland and *without* any of the symptoms of diabetes. The relation, therefore, of the pancreas to diabetes is undetermined, but that its diseased condition is coincident with abnormal states elsewhere, and the effect rather than the cause of diabetes, is tenable.

That diabetes is a true neurosis and its seat in the nervous system seems proven. It is closely allied to the various forms of neurasthenic polyuria, or so-called diabetes insipidus, and to nervous dyspepsia.

It is associated with mild forms of depression and general morbid mental conditions and melancholia. It often follows mental shock, or great physical excitement. Various alterations in the mental powers, the loss of memory, and changes in the special senses are present in some form in nearly every ease, especially those having a neurotic heredity. Ataxic symptoms, the abnormal condition of the reflexes, psychical

and nervous symptoms are present in every case to greater or less degree.

The above conditions, instead of being symptoms or complications merely, of diabetes are both remote and exciting causes.

The puncture of the floor of the fourth ventricle inhibits the capacity of the hepatic cells to retain the glycogen by its effect on the medulla and the vasomotor nerves of the liver. Glycogen is then set free to be taken into the circulation and eliminated by the kidneys, the breath and the perspiration. Arteriosclerosis in this region through the sympathetic ganglia increases the polyuria and prevents oxidation and assimilation of proteids. The most direct relation seems to exist between the medulla and the liver with reference to the retention of glycogen, and injuries or disease of the various parts of the nervous system are frequently followed by glycosuria. As illustration from one of a number of such cases: A patient now under my treatment fell more than 400 feet in a snow slide and thought every moment he would be killed, the longest distance fallen was 150 feet. He was confined to bed sixteen months, but entirely recovered from the injuries. The urine, which was examined several months previously and found normal, showed after the accident the presence of sugar, which has been present ever since in variable quantities. The quantity of urine has varied, being from 1,500 to 2,000 c. c. to normal, the amount depending upon the patient's general condition and the nervous excitement which he is under. During the past year his neurasthenic condtion and general health have improved greatly, and the diabetic symptoms have subsided with general treatment and a wholesome unlimited diet.

As in every other disease, an early diagnosis and prompt treatment from the beginning are all-important. In every patient a urinalysis should be made every six months. The entire amount of urine for twenty-four hours should be used, or, if not possible to obtain this, that on arising in the morning or within an hour after the hearty meal of the day.

The fermentation test, with the use of the saccharometer, is reliable and acurate, as well as the best to determine the

amount of sugar. The Haines' test is equally reliable, and is quickly made.

The phenyl-hydrazin test is definite, but requires a longer time. The amount of sugar is not so important as its presence, which shows the changes occurring in the body, of which this is only an index. Some diabetics feel better when passing some sugar. A trace even of sugar is not present in normal urine. It may be absent in cases of *high* specific gravity, when there is abundance of urates and free uric acid.

Polyuria and thirst are usually the first symptoms noted, with the urine of a water color and a specific gravity of 1020 to 1040, except where granular kidney is present with diabetes, when the specific gravity may be low, and yet sugar be present.

The amount may be from a quart to a gallon, and the polyuria and low specific gravity exist for several weeks before the detection of sugar. It is impossible to tell whether or not a polyuria will eventuate in a diabetes, so we are warranted in beginning treatment at once. A polyuria may exist for many weeks and disappear, with no sugar, and this may recur several times and finally sugar be found, which may rapidly increase in amount until the case becomes a grave one.

The polyuria is increased at night, or from four until nine o'clock in the morning, during which time twothirds to three-fourths of the amount for the entire twenty-four hours is secreted, although the amount of urine corresponds somewhat with the amount of liquid taken. The sugar often disappears and reappears during the progress of the disease, so that every case needs constant watching and medical care.

Thirst and hunger are increased in most cases, though there are cases where there is little thirst and entire loss of appetite. Defective stimulation of the salivary glands, causing lessened secretion, as in many other nervous conditions, is the chief cause of the thirst, and may often be relieved by water held in the mouth.

There is a notable disturbance of the nutrition of the entire body, general debility and neurasthenic symptoms, with indefinable weakness and prostration, headache, sleeplessness, various neuralgias and cramps, with formication and numb-

ness. There is usually mental depression, and a morbid exaggeration of the symptoms. The patient is often determined to make daily analysis and measurements of the urine. In fact, he presents the whole group of symptoms of nerve starvation.

Treatment should be essentially constitutional. Four to six weeks of the rest cure, with all its accompaniments, a good doctor, a good nurse, frequent and full quantities of wholesome nutritious food, faradization, massage, hydrotherapeutics, and remedies to increase the digestion and assimilation of the carbohydrates, should be placed first.

The maintenance of the highest degree of health of the entire system, with the removal of every source of irritation and every abnormal physical condition, is essential. This treatment should be followed by the gradual convalescent treatment as in any other manifestation of general neurasthenia. The complications should be treated symptomatically.

I believe the profession has been relying too much upon the patient, and too much upon the miller, and pharmacist, and too much upon the diet. There is no such thing as a diabetic diet, diabetic flour, or even genuine gluten flour. These things have been given too much commercial importance, to the detriment of the physician and the patient. Saccharin and crystellose have no nutritive value, levulose and dextrose are too unimportant for consideration.

Of 1.90 lbs. (dry) food, the average amount taken by a healthy person, 1.00 lb., or more than all other solids combined, is *starch*, proteids .50 lb., salts .40 lb.

The quantity of starch or any other food should be limited to the ability of the patient to assimilate that particular kind of food, with digestants to aid its appropriation, and an abstemious diet should be directed in these cases, as in any others, according to the judgment of the physician in charge.

The patient should be ordered a definite diet, according to the climate, the season and his condition of nutritive need, and it should be changed according to his nutrition and ability to care for certain kinds of food, with but little reference to the increase or decrease of the amount of sugar, which is variable under every kind of treatment or no treatment.

From four to six ounces of rye bread a day, which contains 65 to 80 per cent. of carbohydrates; thoroughly cooked rice once a day, a well baked potato every other day, with milk, cream, fish, meats (except pork), all green corn, green vegetables, fruits, nuts, cheese, may be eaten. A light breakfast, a hearty dinner and moderate supper is a good division.

Eggs may be taken in quantity when the liver is active, and fat and flesh in large quantities in absence of excess of uric acid.

Patients should drink all the milk and cream they want for its lactose.

Allow the patient all the water he needs, giving it acidulated, although the blood should be kept alkaline, and the urine neutral or slightly acid.

Cabbage will slake the appetite for sugar, while spinach, cresses and onions contain salts and other alkaline bases that are valuable. Lithia waters and sodium salicylate and phosphate, with chloride of sodium, help the condition of the blood. As two-thirds of the water escapes through the kidneys, when the polyuria is excessive, saline laxatives and hydriatic treatment, to aid elimination from the bowels and skin and equalize the blood pressure, are of very great value. Intestinal autointoxication and constipation should be treated vigorously.

In the convalescence, outdoor life and exercise are extremely important. Muscular exercise consumes the sugar and diminishes the glycogen, but should be prescribed and directed as definitely as the dietary. A dry, warm, equable climate, where transpiration through the skin is augmented, and where the patient can have good food and the recreation and exercise of outdoor life and occupation, is as valuable in this as in any other general nervous disease. Where the patient's nutrition is too low for exercise, and the eliminative organs are at fault, systematic massage and hydrotherapeutics offer every advantage under a competent physician's direction.

MINUTES.

Proceedings of the twenty-fifth annual meeting of the Mississippi Valley Medical Association, held in Chicago, October 3d, 4th, 5th and 6th, 1899.

TUESDAY, OCTOBER 3d — *First General Session.*

The association convened in Handel Hall, and was called to order at 10:45 A. M., by Dr. Harold N. Moyer, of Chicago, chairman of the Committee of Arrangements.

Rev. H. W. Thomas, of Chicago, offered prayer, after which Dr. Moyer introduced Judge Cavanaugh, of the Superior Court, who delivered the following

ADDRESS OF WELCOME.

Mr. President and Members of the Mississippi Valley Medical Association: In the absence of the City's Executive, Mayor Harrison, the pleasing duty falls upon me to welcome you to this city. The people of Chicago welcome you, ladies and gentlemen, not because of what you have done, or what you are doing, nor particularly because of the vital and lasting interest we have in the result of your deliberations, but because of the eminence to which your profession, above all other professions, has attained. There is no man who has higher objects before him than the physician. I will say, not even excepting my own profession, there is no profession in which there are so many temptations. Cupidity with its heavy bribe; fear with its golden arguments; shame with its crimson pleadings, are obstacles in the path between you and your duty every day, and in spite of those things you have won the veneration and the love and esteem of your countrymen. [Applause.]

There are two kinds of doctors. One is the severe, cold-hearted man, who loves his profession in the abstract way, who pursues his avocation for the sake of it, and I know physicians who would rather kill a man logically than to cure him illogically. [Laughter.] Then there is the other kind of doctor, the man with a clear head, a steady hand,

and a warm heart. I have seen him enter the darkened sick room, and it seemed as though the sunshine followed him. The poor, pain-racked sufferer, not a mere machine needing repair, but a human being throbbing with love and fear, is made to feel happy and comfortable if the physician ministers to him. It needs more than a simple knowledge of anatomy to do this. It is this kind of doctor who faces the winter storms and dies earlier than his fellow practitioner. [Applause.]

I want to say to you, Mr. President and gentlemen, that, as your chairman of the Committee of Arrangements has said, I occupy the Superior Bench of Cook County, and should any of you get into any trouble with the police during your stay here, I shall be ready at any time to issue promptly a writ of habeas corpus. [Laughter.] So you are at liberty to do anything you choose while here. We feel that during your short sojourn here you will learn to like us and our city. [Applause.]

Dr. Frank Billings, of Chicago, then followed with an address of welcome on behalf of the local profession.

ADDRESS OF WELCOME BY DR. BILLINGS.

Mr. President and Members: It is a great pleasure to me to represent the physicians of Chicago and deliver an address of welcome to you. In this day of medicine, with our means of rapid transit, with our press which disseminates knowledge, it is not alone in the cities that we find perhaps the best medical knowledge. Everywhere, all over the broad land, any man has the possibility of attaining all that man can attain, and while you are in Chicago you will perhaps see nothing new; still there are some things which in your smaller cities and towns you do not have that we may have. This applies more particularly to our hospitals and clinics. Your Committee of Arrangements has made provision for your seeing our hospitals and clinics. A vast number of clinics will be open to you for the next few days, and this is but one expression of the interest which the medical profession of Chicago will show toward you. There are other things you may see here. The medical profession of this city does not differ from the profession in the country, unless it partakes something of the rush and roar of this Windy City. We are all hard workers in our schools in Chicago, but, like the rest of the people of this city, we can pause when occasion requires and meet our fellows, and we will meet with you.

In addition to the eloquent words of Judge Cavanaugh, I can say to you that all the doctors here are good fellows, including our sisters in the profession, and I believe this will be verified by you before you leave us. I have no hesitation in saying that there are more good fellows to the square foot in this city than in any other place on God's footstool. [Applause.]

We welcome you, therefore, to Chicago, and will give you all that we can, medically. We ask you to come to our hospitals, to attend our clinics, and we will be glad to welcome you everywhere, even to our homes. [Applause.]

Dr. Moyer then declared the twenty-fifth annual meeting opened and ready for business. He presented the president, Dr. Duncan Eve, of Nashville, Tenn., who took the chair.

The president stated that the first thing in order was a report by the chairman of the Committee of Arrangements, Dr. Moyer.

Dr. Moyer made the following verbal report: On behalf of the committee, I will say that it is customary to have at these meetings a button by which to identify the members. These buttons were ordered many weeks ago, but have not yet arrived. We expect them to-morrow.

There will be an informal smoker at the Sherman House this evening, tickets for which can be obtained at the registration rooms.

Your committee has nothing further to report at this time.

The President: We will now listen to the report of the secretary, Dr. Henry E. Tuley.

Dr. Tuley read the following report:

Mr. President and Gentlemen: Your Secretary begs leave to submit the following report:

The Association has never been in so prosperous a condition as at the present time. By constitutional provision, adopted at the Nashville meeting, membership in the Association is made continuous and dependent upon regular annual payment of dues, non-payment for two years causing forfeiture of membership. Though bills for dues had never been sent to delinquent members in the history of the Association, I have the pleasure to report that $120.00 was added

to the Treasury during the interim between meetings for 1898 dues. There are a number who are still in arrears, three members resigned because of the bills, but with that exception there were no other complaints.

But two deaths have been brought to my notice during the year, those of Dr. George Beeler, of Clinton, Ky., and Dr. Max Thorner, who died suddenly in his home in Cincinnati. The Committee on Necrology has been notified in regard to these.

There have been six additions to membership in the Association during the year, their names conditionally received, pending the action of the Committee on Credentials at this meeting. The dues for three of these, amounting to nine dollars, have been transferred to the Treasurer.

A copy of the revised Constitution and By-Laws has been sent each member of the Association, and enough provided that each new member may receive a copy on registration. There are at present 300 members on the roll.

The Secretary is being importuned continually for copies of the membership roll by both professional men and mercantile houses. These requests have been denied, with perhaps one or two exceptions, as he has no authority whereby it can be surrendered.

Several notices of this meeting have been sent each member of the Association, and a copy of the preliminary program sent several weeks in advance.

The work of the Committee of Arrangements in preparation for this meeting is fully appreciated. The program and invitation sent to 35,000 physicians in the Valley and territory contiguous to Chicago is a valuable souvenir, and the week of clinics before and after the meeting bespeaks for the profession of Chicago the greatest expressions of appreciation, which we are sure will be forthcoming in a suitable manner.

The program offered is worthy of mention. For its scientific interest, the variety of its titles, the widely distributed parts of the Valley represented, the prominence of its essayists, it certainly has no rival in former years.

Provision has been made for the issuance of a volume of Transactions of this meeting, containing full discussions in general sessions, medical and surgical sections. In order to facilitate the work of issuing this volume, we urge the members to hand in their papers immediately after reading. The interest in a volume of Transactions is proportionately increased by the promptness of its appearance after a meeting.

In conclusion your Secretary wishes to express his appreciation of the universal consideration shown him during the

past year on the part of the officers of the Association, its Executive Committee and members, and to make the following recommendations:

That the Secretary, upon the advice of the President, be empowered to receive members upon the roll, they having satisfied all other constitutional provisions, in the interim between meetings.

That there be selected each year an orator to make an address upon the morning of the fourth day. It is difficult at best to hold the members together upon that day, and this would prove an attractive feature, leaving the subject of the address to the Nominating Committee or the President-elect.

All of which is respectfully submitted,

HENRY E. TULEY,
Secretary.

On motion, the report was accepted, and the recommendations made therein referred to the Executive Committee.

The Treasurer's report, by Dr. Dudley S. Reynolds, of Louisville, was next called for, and was read, as follows:

TREASURER'S REPORT.

Mr. President: I am pleased to inform you that there were in the Treasury, at the last annual report, October 11, 1898	DR. $ 21 11	CR.
I received from the Committee on Registration, at the last annual meeting	380 00	
Since the last annual meeting I have received from the Secretary	148 08	
Total	$549 19	
Since the last annual meeting I have disbursed, as per vouchers attached		$415 23
There are now in the Treasury, as shown by Pass Book of the Third National Bank, of Louisville		133 96
		$549 19
Balance in the Treasury, October 3, 1899	$133 96	

As may be observed from the foregoing statement, the credit of this cash balance is not only unprecedented in the history of the Society, but it should not be forgotten that you are indebted altogether to the indefatigable efforts of your very efficient Secretary for this healthful financial condition.

All of which is most respectfully submitted by

Your humble servant,

DUDLEY S. REYNOLDS,
Treasurer.

On motion, the report was accepted.

Dr. S. C. Stanton, Chairman of the Committee on Credentials, made the following report:]

The Committee on Credentials reports favorably on the following names:

Alexander C. Smith	Sterling, Ill.
A. P. Taylor	Lexington, Ky.
H. H. Hatcher	Dayton, Ohio.
H. L. Baird	Asheville, N. C.
J. T. Leeper	Lenoir City, Tenn.
Eugene R. Morris	Asheville, N. C.
Daniel E. Sevier	Asheville, N. C.
Lewis B. McBrayer	Asheville, N. C.
Geo. F. Butler	Chicago.
Carl V. Reynolds	Asheville, N. C.
Marshall H. Fletcher	Asheville, N. C.
Sterling B. Taylor	Columbus, Ohio.
Russell G. Floyd	Eureka Springs, Ark.
James M. Ringo	Louisville, Ky.
B. S. Louthan	Sutherland, Ia.
W. O'Neal Mendenhall	Richmond, Ind.
J. W. Coleman	Union, Ind.
Joseph R. Luten	Fulton, Ky.
Pleasant W. McKeel	Wingo, Ky.
Chauncey M. Skinner	Hartland, Wis.
Charles K. Bruner	Greenfield, Ind.
C. W. Barrett	Chicago.
C. Lester Hall	Kansas City, Mo.
A. G. Hejinian	Anamosa, Ia.
J. T. Keefer	Sterling, Ill.
Jane Reid Keefer	Sterling, Ill.
James H. Stowell	Chicago.
James Lawless	Chicago.
Charles S. Bacon	Chicago.
Frank Allport	Chicago.
Jacob Waldschmidt	St. Cloud, Wis.
I. W. Fink	Hillsboro, Ill.
E. H. Bryan	Glasgow, Ky.
Samuel F. Brothers	New York City.
John P. Gilmer	Louisville, Ky.
John W. Porter	Omaha, Neb.
Louis E. Schmid	Chicago.
Otto L. Schmidt	Chicago.
Alex. G. Graybill	Caledonia, Mich.
James A. Work	Elkhart, Ind.
E. W. Lamoreaux	Battle Creek, Mich.

Marcus A. Newell.....Sheridan, Ky.
John T. Allen.....Brownsville, Tenn.

S. C. STANTON, Chairman,
J. H. STOWELL,
Committee on Credentials.

On motion of Dr. Culbertson, seconded by Dr. Cordier, the various applicants for membership were duly elected.

Here Dr. A. J. Ochsner, the First Vice-President, took the chair, and Dr. Eve delivered the President's Address. He selected for his subject "Malpractice and the Damage Suit."

On motion, the association adjourned until 9:30 A. M. Wednesday.

OCTOBER 4TH.—*Second General Session.*

The association met at 9:30 A. M., with the president in the chair.

The secretary announced the names of the Committee on Nominations, as follows:

INDIANA	Wm. N. Wishard, chairman	Indianapolis.
TEXAS	Nat Smith	Austin.
ARKANSAS	S. P. Collings	Hot Springs.
NORTH CAROLINA	L. B. McBrayer	Asheville.
MICHIGAN	H. O. Walker	Detroit.
MISSOURI	John Punton	Kansas City.
OHIO	Thos. Charles Martin	Cleveland.
NEW YORK	L. H. Warner	Brooklyn.
PENNSYLVANIA	Wm. F. Barclay	Pittsburg.
NEBRASKA	H. W. Hewitt	Friend.
SOUTH DAKOTA	D. H. Holmgren	Canton.
MINNESOTA	Vincent J. Hawkins	St. Paul.
WISCONSIN	Chauncey M. Skinner	Hartland.
KENTUCKY	James B. Bullitt	Louisville.
TENNESSEE	W. Frank Glenn	Nashville.
IOWA	T. P. Stanton	Charlton.
ILLINOIS	Frank C. Greene	Chicago.

The President.—The next thing in order is the report of the Executive Committee, which will be read by Dr. Dudley S. Reynolds.

Dr. Reynolds presented the following report:

REPORT OF THE EXECUTIVE COMMITTEE.

Mr. President: We have carefully considered the matters submitted to us and beg leave to report as follows:

1. We believe it unwise for the Executive Committee to assume authority to dictate to the officers how they shall arrange the programme of exercises for future meetings.

2. Whilst we recognize our worthy secretary's ability, and sound discretion, we fear it would be unwise to alter the constitutional provision for admitting new members.

3. We wish to commend the secretary for his efficiency in general and for his carefully prepared compilation of the published list of former officers and places of meeting of this association from its organization in 1875 to the present time.

4. After a careful reading of the official circular of the director of the United States census for 1900, we find the form of return of a death sufficiently comprehensive to deserve our commendation, and we most heartily endorse it as an important improvement upon former returns.

We would most respectfully urge all the local authorities in the United States to adopt and observe the suggestion of the director of the census embraced in the official circular.

On motion the report was adopted and referred for publication.

Dr. J. A. Witherspoon, of Nashville, Tenn., was introduced, and delivered the address in medicine. He selected for his subject "Typhoid Fever."

On motion of Dr. John L. Jelks, a vote of thanks was extended to Dr. Witherspoon for his very able and instructive address.

The Committee on Credentials, through its chairman, Dr. S. C. Stanton, reported the following applications for membership, which after reading were unanimously elected to membership:

O. J. Stein	Chicago, Ill.
Frank B. Marshall	Girard, Mich.
W. M. Harsha	Chicago, Ill.
Robert Wallace Hardon	Chicago, Ill.
Arthur Dean Bevan	Chicago, Ill.
Denslow Lewis	Chicago, Ill.
F. Kreissl	Chicago, Ill.
H. L. Gregg	Silver Creek, Neb.
Rosa Engelmann	Chicago, Ill.

Hamilton W. Hewitt.....Friend, Neb.
Emery H. Bayley .....Lake City, Minn.
John A. Robison.....Chicago, Ill.
H. H. Brown .....Chicago, Ill.
John Lincoln Porter .....Chicago, Ill.
J. Vinton Bacon.....Chicago, Ill.
W. D. Pennington.....West Baden, Ind.
Robert H. Harvey.....Chicago, Ill.
Edwin Warner Ryerson.....Chicago, Ill.
Allen T. Haight.....Chicago, Ill.
J. Y. Crawford.....Nashville, Tenn.
S. M. Wylie.....Paxton, Ill.
John B. Baker.....Pontiac, Ill.
John Calvin Hoshor.....Rosendale, Mo.
John E. Allaben.....Rockford, Ill.
Geo. R. Proctor .....Coleta, Ill.
H. C. Howard .....Champaign, Ill.
J. F. Barton .....Shawneetown, Ill.
William C. Davis .....Chicago, Ill.
J. D. Brownson .....Elkader, Iowa.
Eugene Byran Glenn .....Asheville, N. C.
H. Holmgren.....Canton, S. D.
Chester I. Pease.....Linn Grove, Iowa.
Francis R. Sherwood.....Chicago, Ill.
Olof Sohlberg - .....St. Paul, Minn.
William Henry Poole.....Detroit, Mich.
Edwin Bentley.....Little Rock, Ark.
M. M. Smith.....Austin, Texas.
Wm. E. Washburn.....Kewanee, Ill.
Alonzo B. Walker .....Canton, Ohio.
Jacob F. Marchand .....Canton, Ohio.
Roland H. Henry .....Peotone, Ill.
W. S. Christopher.....Chicago, Ill.
H. E. Pelle .....Louisville, Ky.
G. L. Peck .....Youngstown, Ohio.
James O. Carson .....Bowling Green, Ky.
Guy B. Case.....Cleveland, Ohio.
Eley E. Perisho.....Ancona, Ill.
J. R. Williams.....White Pigeon, Mich.
Geo. W. Webster.....Chicago, Ill.
John J. Quirk.....Chicago, Ill.
John O'Kelly Gant .....Plattsburg, Mo.
James H. Taylor.....Indianapolis, Ind.
J. P. Connell.....Fond du Lac, Wis.
C. H. McKain..... .....Vicksburg, Mich.
Andrew B. Chapin .....Mt. Clemens, Mich.
Wilson T. Lawson.....Danville, Ind.

S. C. STANTON,
J. H. STOWELL,
Committee on Credentials.

On motion, the association adjourned until Thursday, at 9:30 A. M.

OCTOBER 5TH.—*Third General Session.*

The association was called to order by the president, at 9:30 A. M.

Dr. Moyer announced a banquet to be given at the Athletic Club for the members and guests.

The secretary read letters of regret from absentees, also invitations from various medical schools in Chicago to visit them.

Dr. Lewis S. McMurtry, of Louisville, delivered the address in surgery. His subject was "The Essential Requirements of a Modern Operative Procedure."

On motion of Dr. I. N. Love, a vote of thanks was tendered to Dr. McMurtry for his excellent address.

Dr. Moyer offered the following resolution with reference to taxes upon medicines and surgical appliances:

WHEREAS, The war tax upon medicines, drugs and surgical appliances used in the treatment of disease is in effect a tax upon invalids, therefore be it

Resolved, That in the opinion of this association, congress should at the earliest moment repeal these taxes and raise the necessary revenue by taxes laid on other articles.

After some discussion, which was participated in by Drs. Dudley S. Reynolds, I. N. Love, and Vincent J. Hawkins, the resolution was tabled.

The Committee on Credentials reported favorably upon the following applicants for membership, who were unanimously elected:

John Ridlon	Chicago, Ill.
A. E. Kauffman	Parkersburg, Iowa.
B. T. Whitmore	New York City, N. Y.
Arnold C. Klebs	Chicago, Ill.
G. J. Rivard	Assumption, Ill.
F. W. Cram	Sheldon, Iowa.
C. Fisch	St. Louis, Mo.
W. Sudduth	Chicago, Ill.
E. W. Tonkin	Edwardsburg, Mich.
H. A. Jegi	Galesville, Wis.

William Taylor Foute ---------- Lenoir City, Tenn.
Chas. W. Carter ---------- Aledo, Ill.
Cadwalader Hicks ---------- Mt. Vernon, Ind.
J. O. Stillson ---------- Indianapolis, Ind.
George H. Simmons ---------- Chicago, Ill.
Wm. C. Abaly ---------- Madison, Wis.
Chas. E. Paddock ---------- Chicago, Ill.
Everett J. Brown ---------- Decatur, Ill.
Henry B. Favill ---------- Chicago, Ill.
W. F. Pierce ---------- Carson, Pottawattamie Co., Ia.
C. B. Brown ---------- Sycamore, Ill.
Norval H. Pierce ---------- Chicago, Ill.
Marie J. Mergler ---------- Chicago, Ill.
Wm. L. Noble ---------- Chicago, Ill.
John W. Fuqua ---------- Urbana, Ill.
Jesse Leland Boogher ---------- St. Louis, Mo.
T. J. Shuell ---------- Parnell, Iowa.
Albert I. Bouffleur ---------- Chicago, Ill.
Xenophen C. Scott ---------- Cleveland, Ohio.
Fred Wm. Werner ---------- Joliet, Ill.
Edward S. Stevens ---------- Lebanon, Ohio.
E. H. Lee ---------- Chicago, Ill.
R. I. Mattice ---------- Omaha, Neb.
Reuben Peterson ---------- Chicago, Ill.
Richard R. Smith ---------- Grand Rapids, Mich.
Franklin W. Eskey ---------- Prophetstown, Ill.
Warren Loring Beebe ---------- St. Cloud, Minn.
David W. Stevenson ---------- Richmond, Ind.
Thomas J. Watkins ---------- Chicago, Ill.
C. H. Beard ---------- Chicago, Ill.
R. E. Haughton ---------- Richmond, Ind.
Ernest L. Hayford ---------- Chicago, Ill.
Samuel J. Walker ---------- Chicago, Ill.
Edward A. Hanna ---------- Chicago, Ill.
N. B. Crawford ---------- Eureka, Ill.
Wellington T. Stewart ---------- Chicago, Ill.
Emory Lanphear ---------- St. Louis, Mo.
H. T. Hardy ---------- Kaneville, Ill.
Frank T. Andrews ---------- Chicago, Ill.
K. S. Piatt, M. D. ---------- Avalon, Mo.
John J. Kyle ---------- Indianapolis, Ind.

S. C. STANTON,
J. H. STOWELL,
Committee on Credentials.

On motion, the association adjourned until Friday, 9:30 A. M.

OCTOBER 6TH.—*Fourth General Session.*

The association met at 9:30 A. M. with President Eve in the chair.

The Committee on Credentials desires to report favorably on the following names:

A. F. Lemke	Chicago, Ill.
James F. Percy	Galesburg, Ill.
J. B. Kirby	Verona, Ill.
James Martin Postle	Hinckley, Ill.
Jacob O. Malsbury	Peru, Ind.
S. L. Kilmer	South Bend, Ind.
A. W. Rush	Greenville, Ohio.
Charles Edwin Boddiger	Chicago, Ill.
H. Edward Sauer	Chicago, Ill.
Morey L. Reed	Chicago, Ill.
John P. Webster	Chicago, Ill.
F. W. E. Henkel	Chicago, Ill.
Wm. Cuthbertson	Chicago, Ill.
J. H. Finestone	Freeport, Ill.
D. W. Graham	Chicago, Ill.
J. M. Auld	Chicago, Ill.
J. A. Freeman	Millington, Ill.
W. E. Fraser	Chicago, Ill.
Eliza H. Root	Chicago, Ill.
F. E. Bunts	Cleveland, Ohio.
R. F. Robinson	Egan, S. D.
Kael Gryttenholm	Zumbrota, Minn.
Samuel Knox Crawford	Chicago, Ill.
Wm. B. Lyman	Mendota, Wis.
LeRoy W. Beardsley	St. Louis, Mo.
Louis H. Friedrich	Chicago, Ill.
Henry W. Sawtelle	Chicago, Ill.
A. L. Warner	Chicago, Ill.
Willard C. Sanford	Chicago, Ill.
Wm. T. Dodge	Big Rapids, Mich.
C. Van Zwalunenburg	Kalamazoo, Mich.
Gustavus M. Blech	Chicago, Ill.
C. P. Ambler	Asheville, N. C.
John Edward Walton	Medora, Ill.
E. S. Murphy	Dixon, Ill.
A. R. Small	Chicago, Ill.
Philip Zenner	Cincinnati, Ohio.

A. M. Wilson.....Kansas City, Mo.
C. H. Henry.....Coon Rapids, Iowa.
William E. Casselberry .....Chicago, Ill.
Horace M. Starkey .....Chicago, Ill.

S. C. STANTON,
J. H. STOWELL,
Committee on Credentials.

The report of the Nominating Committee was read, and is as follows:

REPORT OF THE NOMINATING COMMITTEE.

At a meeting of the Nominating Committee, the Chairman, Dr. W. N. Wishard, presiding, the following were placed in nomination:

President.—Dr. Harold N. Moyer, Chicago, Ill.

First Vice-President.—Dr. A. H. Cordier, Kansas City.

Second Vice-President.—Dr. S. P. Collings, Hot Springs, Ark.

Secretary.—Dr. Henry E. Tuley, Louisville, Ky.

Treasurer.—Dr. Dudley S. Reynolds, Louisville, Ky.

Chairman of Committee of Arrangements.—Dr. M. H Fletcher, Asheville, N. C.

The next place of meeting, Asheville, N. C.

Time of meeting, October 9, 10, 11, 1900.

On motion, the report was adopted.

The president appointed Drs. Ochsner and Barclay to escort the newly elected president to the chair.

Dr. Moyer was warmly received, and in accepting the presidency, said:

Mr. President and Gentlemen: My feelings prompt me at this time to utter a long and carefully prepared oration, but you notice that there are some physical defects in pronouncing it. My voice has quite failed me. However, I wish to say that I have a very high appreciation of the honor that you have so unworthily bestowed. As your president for the coming year, I shall do the best that I can, and I am sure you will ask nothing more of me than that. I know that I can only rattle around in the position that has been

filled by such men as Mathews, Eve, and other leading men in the Mississippi Valley. But I will rattle around just as hard as I can. [Applause.]

Remember this, that it is not one man who makes the whole show, any more than one odor makes a bouquet, and, at most, all the officers of this association can do is to supply what Montaigne said regarding his essays, that they were merely the string which bound a bunch of flowers together, that is all the officers can do. They are merely the binding twine of the association, and they need the hearty and efficient co-operation of all of the members, and I am sure, on behalf of myself and fellow officers, I can ask of you your hearty support and know we will have it. We have added not a little to our membership, and the association has been materially strengthened. We have gone into new territory and gathered in new members; we have infused some new blood corpuscles, and I trust we shall not have a severe phagocytosis. Gentlemen, I await your further pleasure. [Applause.]

Dr. C. L. Minor, of Asheville, N. C., offered the following resolutions of thanks:

RESOLVED, That the thanks of the association be extended to the chairman of the Committee of Arrangements, Dr. Moyer and his associates, in making provision for such an hospitable and warm reception.

RESOLVED, That our thanks be extended to the Entertainment Committee, to the ladies, etc., who have ministered to our social wants with such warmth and generosity.

On motion, the resolutions were unanimously adopted.

The president appointed as the Committee on Publication, Drs. Henry E. Tuley, chairman, Dudley S. Reynolds, and Lewis S. McMurtry, all of Louisville.

On motion of Dr. Stowell, the association then adjourned to meet at Asheville, N. C., October, 9, 10, 11, 1900.

MINUTES OF THE SURGICAL SECTION.

Dr. A. J. Ochsner, of Chicago, Chairman.
Dr. Charles A. Davidson, of Chicago, Secretary.

October 3d—*First Session.*

The following papers were read and discussed:

1. "Vesico-Rectal Anastomosis," by Dr. Jacob Frank, of Chicago. Discussed by Drs. Walker and Martin, and, in closing, by the essayist.

2. "Some Complications Met with Before and After Operation for Hemorrhoids," by Dr. John L. Jelks, of Memphis, Tenn. Discussed by Drs. Mathews, Pennington, Hall, Hawkins, Taylor, Walker, Martin, and, in closing, by the essayist.

3. "Mastoid Operation, with Cases," by Dr. George F. Keiper, of Lafayette, Ind. Discussed by Dr. Ballenger, and, in closing, by the essayist.

4. "Modern Surgical Treatment of Hemorrhoids," by Dr. Gustavus M. Blech, of Chicago. Discussed by Drs. Bryan, Jelks, and, in closing, by the essayist.

5. "Beta-Eucaine as an Anesthetic in Eye Surgery," by Dr. W. H. Poole, of Detroit, Mich. Discussed by Dr. Blech, and, in closing, by the essayist.

Adjourned.

October 4th—*Second Session.*

6. "Intolerant Ulceration of the Rectum, with Report of Five Cases," by Dr. Sterling B. Taylor, of Columbus, Ohio. Discussed by Dr. Martin.

7. "Obstructive Growths of the Pylorus, with Report of a Successful Case of Pylorectomy," by Dr. J. A. Allaben, of Rockford, Ill.

8. "The Value of Prostatic Examination," by Dr. J. L. Boogher, of St. Louis, Mo. Discussed by Dr. Wyman.

9. "What Becomes of Medicinally Treated Cases of Appendicitis?" by Dr. LOUIS SCHOOLER, of Des Moines, Iowa. Discussed by Drs. Allaben, Bryan, Malsbury, Moyer, Brunner, Hawkins and Bouffleur.

Adjourned.

Third Session.

10. "Surgical Features of Appendicitis," by Dr. HAL C. WYMAN, of Detroit, Mich.

11. "A Unique Case of Appendicitis," by Dr. JAMES T. JELKS, of Hot Springs, Ark. These two papers were discussed jointly by Drs. Carstens, Brown, Haughton, Crawford, Bullitt, Cordier, Schaefer, Hawkins, Lanphear, and the discussion closed by the essayist.

12. "Intestinal Obstruction from Gall Stones," by Dr. J. WESLEY BOVÉE, of Washington, D. C. Discussed by Drs. Humphrey and Bovée.

Adjourned.

OCTOBER 5TH—*Fourth Session.*

13. "Nasal Stenosis Due to Defective Septa, and Its Treatment, With or Without Thickening of the Convex Side," by Dr. JOHN J. KYLE, of Indianapolis, Ind. Discussed by Drs. Ballenger, Stein, Brunson, and the discussion closed by the essayist.

14. "Removal of Cervical Sympathetic for Epilepsy, Exophthalmic Goiter and Glaucoma," by Dr. EMORY LANPHEAR, of St. Louis, Mo. Discussed by Dr. Moyer.

Dr. LAWS, of Philadelphia, exhibited instruments for illuminating the rectum and described their use. Discussed by Drs. Pennington, Martin, Mathews, Haughton, Taylor, Jelks, Crile, and the discussion closed by Dr. Laws.

Adjourned.

Fifth Session.

15. "Surgery of the Turbinated Bones," by Dr. J. A. STUCKY, of Lexington, Ky. Discussed by Drs. Ballenger, Stein, Crile and Stucky.

16. "Mammoth Ovarian Tumors; Report of a Cyst

Weighing 245 Pounds," by Dr. JAMES B. BULLITT, of Louisville, Ky. Discussed by Dr. Cordier.

17. "Observations on Surgery of the Brain, Based on Clinical and Experimental Evidence," by Dr. GEORGE W. CRILE, of Cleveland, Ohio. Discussed by Drs. DeVilbiss, Sterne, and the discussion closed by Dr. Crile.

18. "An Arm Saved After Being Run Over by a Railway Locomotive and Crushed," by Dr. S. L. KILMER, of South Bend, Ind. Discussed by Drs. Crile, Grant, Beardsley, and the discussion closed by the essayist.

19. "Obstipation and Its Radical Treatment," by Dr. THOMAS CHARLES MARTIN, of Cleveland, Ohio. Discussed by Drs Taylor and Pennington.

20. "The Modern Small-Bore Projectile," by Dr. AUGUST SHACHNER, of Louisville, Ky.

Adjourned.

OCTOBER 6TH—*Sixth Session.*

21. "Appendicitis from a Medical Standpoint," by Dr. I. N. LOVE, of St. Louis, Mo. Discussed by Drs. Ochsner, Malsbury, Allaben, Witherspoon, Barclay, Crawford, Percy, Haughton, and, in closing, by the essayist.

The following papers were read by title:

22. "A Study of Sixty-one Cases of Appendicitis, Thirty of Whom Were Operated Upon," by FRANK T. MERIWETHER, M. D., Asheville, N. C.

23. "The Treatment of Gonorrhea in the Female," by A. RAVOGLI, M. D., Cincinnati, Ohio.

Adjourned.

MINUTES OF THE MEDICAL SECTION.

Dr. Chas. T. McClintock of Detroit, Mich., in the chair.
Dr. R. A. Bate of Louisville, Ky., Secretary.

October, 3d—*First Session.*

The following papers were read:

1. "Enzymes and Immunity," by Dr. Charles T. McClintock, Detroit, Mich.

2. "Recent Physio-Chemic Researches as to Lecithin and Other Organic Phosphorous Compounds," by Dr. L. H. Warner, of Brooklyn, N. Y.

3. "Some Phases of Malaria—Quinine In," by Dr. Wm. Britt Burns, Deckerville, Ark. Discussed by Dr. L. H. Warner, of Brooklyn, and Dr. T. B. Greenley, of Meadow Lawn, Ky.

Second Session.

4. "The Treatment of Pulmonary Tuberculosis by Inhalation of Antiseptic Nebulæ," by Dr. Homer M. Thomas, of Chicago, Ill. Discussed by Dr. T. B. Greenley, of Meadow Lawn, Ky., Dr. Chas. L. Minor, of Asheville, N. C.

5. "The Successful Treatment of a Case of Graves' Disease as an Autointoxication," by Dr. Chas. L. Minor, Asheville, N. C. Discussed by Dr. Geo. W. Webster, of Chicago, and Dr. Hugh T. Patrick, of Chicago, Ill.

October 4th—*Third Session.*

6. "Do We Need to Think," by Dr. Wm. O'Neal Mendenhall, Richmond, Ind.

7. "The Evils, Their Causes and the Remedy that Will Edify Medicine in the United States," by Dr. A. M. Osness, of Dayton, Ohio. Discussed by Dr. Wm. L. Barclay, of Pittsburg, Pa., Dr. John Punton, of Kansas City, Dr. C. M. Skinner, of Hartland, Wis.

8. "Two Cases of Typhoid Fever with Unusual Complications in Very Young Children," by Dr. E. B. MONTGOMERY, of Quincy, Ill. Discussed by Dr. J. O. Malsbury, of Peru, Ind.

9. "Further Observation of the Treatment of the Abdominal Viscera Through the Colon," by Dr. FENTON B. TURCK, of Chicago. Discussed by Dr. Wm. F. Barclay, of Pittsburg, Pa., Dr. Homer M. Thomas, of Chicago, and Dr. Thomas J. Shuell, of Parnell, Iowa.

10. "Report of a Case of Complete Hernia of Pregnant Uterus," by Dr. W. V. ANDERSON, of Toledo, Ohio.

OCTOBER 5TH—*Fourth Session.*

11. "Pathogenesis of Functional Nerve Diseases and Their Prophylactic Indication," by Dr. JOHN PUNTON, of Kansas City. Discussed by Dr. Philip Zenner, of Cincinnati, Dr. Daniel R. Brower, of Chicago, Dr. J. A. Witherspoon, of Nashville, Tenn., and Dr. Wm. F. Barclay, of Pittsburg, Pa.

12. "The Association of Hysteria with Organic Disease of the Nervous System," by Dr. PHILIP ZENNER, of Cincinnati, Ohio. Discussed by Dr. Wm. F. Barclay, of Pittsburg, and Dr. Albert E. Sterne, of Indianapolis, Ind.

13. "Bacteriological Diagnosis in All Diseases of the Conjunctiva and Cornea," by Dr. J. O. STILLSON, of Indianapolis, Ind. Discussed by Dr. Dudley S. Reynolds, of Louisville.

Fifth Session.

This session was held in conjunction with the surgical section.

14. "Intestinal Autointoxication, Its Prevention and Treatment," by Dr. WM. F. BARCLAY, of Pittsburg. Discussed by Dr. Albert E. Sterne, of Indianapolis, Ind., Dr. Henry B. Favill, of Chicago, Dr. J. O. Malsbury, of Peru, Ind., Dr. Chas. L. Minor, of Asheville, N. C., Dr. R. E. Haughton, of Richmond, Ind., Dr. Thos. H. Stucky, of Louisville, Dr. Jas. T. Jelks, of Hot Springs, Ark., and Dr. Fenton B. Turck, of Chicago, Ill.

15. "Indigestion in Infants and Children," by Dr. JAMES H. TAYLOR, Indianapolis. Discussed by those taking part in previous discussion, as papers were read together.

16. "Lithiasis," by Dr. R. ALEXANDER BATE, of Louisville.

17. "Nephrolithiasis," by Dr. A. H. CORDIER, of Kansas City. Discussed by Dr. M. L. Harris, of Chicago, and Dr. J. Wesley Bovée, of Washington, D. C.

18. "Therapeutics of Infectious Conjunctivitis," by Dr. DUDLEY S. REYNOLDS, of Louisville. Discussed by Dr. L. W. Beardsley, of St. Louis, and Dr. J. J. Kyle, of Indianapolis.

19. "Introversion of Iris," by Dr. L. W. BEARDSLEY, of St. Louis, Mo.

20. "A Contribution to the Study of Lung Reflexes," by Dr. Marion K. Bowles, of Joliet, Ill. Discussed by Dr. J. A. Work, of Elkhart, Ind., and Dr. F. W. Warner, of Joliet, Ill.

The following papers were read by title:

21. "The Treatment of Acute Lobar Pneumonia," by RAMON F. GARCIN, M. D., Richmond, Va.

22. "Diabetes and Its Constitutional Treatment," by ELMORE S. PETTYJOHN, M. D., Alma, Mich.

CONSTITUTION.

Article I.—Name.

This Association shall be known as the Mississippi Valley Medical Association.

Article II.—Objects.

The objects of this Association are to foster, advance and disseminate medical knowledge; to uphold the honor and maintain the dignity of the medical profession.

Article III.—Membership.

Membership in this Association shall be limited to members of the medical profession in good standing.

No one under sentence of expulsion, suspension, or other disability in any regularly organized state, county, district or local medical society shall be eligible to membership in this Association during the existence of such disability.

All applications for membership shall be made through the Committee on Credentials. The annual dues shall be three dollars, payable at time of registration or upon presentation of bill by Secretary.

Article IV.—Meetings.

The regular meetings of this Association shall be held annually. The place of meeting shall be determined by the Nominating Committee; the time by the Committee of Arrangements and the Executive Committee jointly.

Article V.—Officers.

The officers of this association shall be a President, two Vice-Presidents, a Permanent Secretary, Treasurer, and a Chairman of the Committee on Arrangements.

Article VI.—Duties of Officers.

Section 1. *President*—The President shall preside at the meetings of the Association, and perform such other duties

as parliamentary usage and the vote of the Society may require. He shall appoint, on the morning of the second day of each annual session, a Committee on Nominations, consisting of one person from each State represented at the meeting. The person first named in the list shall be Chairman. This Committee shall meet in secret session and proceed to choose by ballot all the officers to be elected for the ensuing year, and the place of the next annual meeting.

SEC. 2. *Vice-Presidents*—The Senior Vice-President, or in his absence a Junior Vice-President, shall assist the President in the performance of his duties, and in the absence of the latter, or at his request, shall officiate at all meetings of the general sessions. If the sessions of the Association are divided into Sections of Medicine and Surgery, the Senior Vice-President shall be *ex-officio* Chairman of the Surgical Section, and the Junior Vice-President shall be *ex-officio* Chairman of the Section of Medicine. In the subdivision of these two, or either one of the sections, they shall, on assembling for business, choose a presiding officer and a Recording Secretary. In all section meetings records shall be kept of all proceedings, and reported to the next ensuing general session of the Association.

SEC. 3. *Permanent Secretary*—It shall be the duty of the Secretary to keep a list of the members and their addresses, to give notice of the meetings of the Association, to keep a record of its proceedings, to conduct its business correspondence, and perform such other duties as may be required. He shall receive all dues paid by members during the interval between annual meetings, and render an account of all such receipts to the Treasurer, on or before the first session of each annual meeting. He shall submit to the Executive Committee the names of the members who are in arrears, and when these are for two years the Council shall declare their membership forfeited. He shall receive annually the sum of $100 for his services.

SEC. 4. *Assistant Secretary*—It shall be the duty of the Assistant Secretary to assist the Secretary in the performance of his duties, and in his absence, or in case of any vacancy in that office, to act as Secretary *ad interim*.

SEC. 5. *Treasurer*—It shall be the duty of the Treasurer to receive and disburse all moneys belonging to the Association. He shall pay out no money except on warrants signed by the presiding officer. The funds of this Association shall in no case be devoted to any purpose other than the necessary expenses of the officers and standing committees, and for the publication of the Transactions.

SEC. 6. *Committee on Credentials*—The Committee on Credentials shall be composed of three members, all of whom shall reside at the place of the annual meeting. The Chairman of this Committee shall be appointed by the President; two members shall be appointed by the Chairman of the Committee on Arrangements. This Committee shall receive all applications for membership, and all dues from the registration of members at the annual meetings, and pay all funds so received to the Treasurer, taking his receipt from time to time as the payments are made.

SEC. 7. *Committee on Arrangements*—The Chairman of the Committee on Arrangements may choose as many assistants as he deems best, and appoint an Assistant Secretary, besides making all arrangements for the annual meetings.

SEC. 8. *Executive Committee*—An Executive Committee, consisting of all the ex-Presidents, the President and vice-Presidents, shall fill by appointment any vacancy in the offices and standing committees occurring in the interval between the annual meetings, and shall examine and audit the accounts of the Secretary and Treasurer for the past year, and report at the executive session of the Association on the second day of each annual meeting.

ARTICLE VII.—CHANGES IN THE CONSTITUTION.

This Constitution shall not be altered or amended, except the proposed alteration or amendment be made in writing and read to a regular session of the Association, and receive at the next annual meeting the approval of a three-fourths vote of all the members present in general executive session.

BY-LAWS.

Article I.

The annual sessions shall be called to order by the Chairman of the Committee of Arrangements. The President, on taking the chair, shall call for the reading of the minutes of the previous meeting, and on the morning of each succeeding day of the annual sessions the following order of business shall be observed, after the reading of the minutes:

Section 1. Announcements of the Committee of Arrangements.

Sec. 2. Report of Secretary.

Sec. 3. Report of sections and subsections.

Sec. 4. Communications from other societies.

Sec. 5. Reports of Committees. They shall be called in the following order: Committee on Credentials, Executive Committee, Committee on Nominations (during the morning session of the last day only).

Article II.

Section 1. The provisions of Article I of these By-laws shall apply to the first thirty minutes of each morning session.

Sec. 2. No essay or report shall be permitted to occupy more than twenty minutes without consent of the Committee of Arrangements or the Association.

Sec. 3. Discussion of papers or reports presented shall be limited to ten minutes for each speaker, and no member shall speak a second time except with the unanimous consent of the Association.

Sec. 4. No essay, report, or other communication presented to this Association shall be published in any but the regular medical journals without the consent of the Executive Committee.

Sec. 5. All questions of debate shall be decided in accordance with Cushing's Manual of Parliamentary Law.

ARTICLE III.

SECTION 1. All questions of ethics and differences be-between members shall be referred without debate to the Executive Committee, whose report shall be final.

SEC. 2. All questions of eligibility for membership shall be determined by the Committee on Credentials.

SEC. 3. No person shall be allowed to participate in the deliberations of this Association who has not registered as a member and paid all dues.

ARTICLE IV.

These By-laws may be amended by a two-thirds vote of all the members present, provided the proposed amendment shall be made in writing and read aloud to the Association on two consecutive days at any annual meeting.

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